

Rob Loftis

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Research Statement

My research is in environmental and medical ethics. These interests are not really distinct. Both areas are places where the philosophy of science intersects with practical, and often the same set of epistemic norms and ethical values are at stake in each. Indeed one of my main interests is in tracing issues as they cross from the human world of medical ethics to the nonhuman world of environmental ethics. Right now I have two published papers about genetic engineering, a topic that comes up in both medical and environmental contexts. The first paper, published in the *Kennedy Institute of Ethics Journal*, makes a direct comparison between the environmental and the medical arena, arguing that the difference in levels of caution we exercise regarding genetic engineering in these two areas is unjustified. The second paper, forthcoming in the volume *Ethical Issues in the Life Sciences*, argues that in the case of agricultural genetic engineering, the real motivation is not attitudes toward caution at all, but attitudes toward economic liberty.

My thinking about environmental ethics has led me to publish some in environmental aesthetics. My first work there was an article for *Philosophy and the Contemporary World* on efforts to place environmental ethics on the foundation of environmental aesthetics. Here, too, there is an analogy between the human and nonhuman world, because I argue for the superficiality of the aesthetics of the environment using an analogy to the aesthetics of human beings. This paper led to a review in *Environmental Ethics* of a book on models of the appreciation of natural environments, and now an essay which has been conditionally accepted to *Environmental Values*, which adds a new model to the discussion of nature appreciation, drawn from Buddhist thinking, which I label the Theragāthā model.

My immediate plans are to make the alterations to the paper on the Theragāthā model that have been requested by the publishers before they accept the paper. After that I want to return to the issue of genetic enhancement. I just reviewed a recent book by law professor Maxwell Mehlman that advocated an elaborate, draconian regime to enforce regulation on human genetic enhancement. I plan to expand the review, which appeared in *Metapsychology Online*, into a full defense of the right to genetic enhancement. My argument would come largely from the right to control of your body and doctor-patient confidentiality, with additional support coming from an examination of just how intrusive any attempt to regulate one's genes would be. I hope to get this piece into a top rank journal like *Ethics* or *The Journal of Philosophy*.

In the longer term, I hope to keep my efforts in environmental ethics focused on agricultural ethics and resource management. The debate over the moral status of wild nature, while it has produced many ideas of theoretical interest, has proven to be largely irrelevant to the most important environmental issues. Global climate change, for instance, is clearly the most pressing issue of the day, but all that can be said about it from the standpoint of wild nature is that there can be no more wild nature. I do see more hope for the discussion of moral status in medical ethics, and I actually believe that theoretical work can be illuminating here. The stem cell debate has shown dire need for

understanding how conflicting ideas about moral status should affect public policy. Here again, I think it would be nice to look at human issues in the context of the nonhuman. What we need, and what I hope to contribute to developing, is a theory of moral status that uses a unified system of standards to judge humans at all stages of life, animals, plants, ecosystems, nations, and even hypothetical entities like intelligent computers or space aliens.

Abstracts

Articles Published and Forthcoming

Loftis, J. Robert. Forthcoming. The Theragāthā Model for the Aesthetic Appreciation of Natural Environments. Conditionally accepted to *Environmental Values*.

Models of the appreciation of nature can be arranged in a space with two axes, one running from the engaged to the disinterested and one running from the cognitive to the noncognitive. I introduce a disinterested, noncognitive model for the aesthetic appreciation of natural environments inspired by the mode of nature appreciation found in the ancient Buddhist sutras the Theragāthā and the Therigāthā. Failure to adopt this model will either cause mental suffering or force the observer to misrepresent nature. This model also solves problems that other theories in analytic nature aesthetics have faced.

Loftis, J. Robert. Forthcoming. The Other Value in the Debate Over Genetically Modified Organism. In *Ethical Issues in the Life Sciences*, ed. F. Adams. Charlottesville, VA: Philosophy Documentation Center.

Much has been made of the role of the precautionary principle in arguments over genetically modified organisms (GMOs) in agriculture, and rightly so. However, I want to highlight the importance of another value at play in this debate, economic liberty. I claim that differences in the importance attached to economic liberty are decisive in deliberations about GMOs. I will argue this point by considering a case study: the decision by the U.S. Animal and Plant Health Inspection Service (APHIS) to grant nonregulated status to Roundup Ready soy. I will show that the unregulated release of this herbicide-resistant crop would not be acceptable morally unless one places a very high premium on economic liberty. This is true even if one takes a sound science attitude to unknown risks, rather than a precautionary attitude. I concede that it may not have been within APHIS's legislative mandate to regulate Roundup Ready soy further, but for those of us who do not put a high premium on economic liberty, this only calls for extending regulatory oversight of GMOs.

Loftis, J. Robert. 2005. Germ-Line Enhancement of Humans and Nonhumans. *Kennedy Institute of Ethics Journal* 15 (1):57–76.

Currently both scholars and the general populace are more worried about the genetic engineering of humans than of plants and nonhuman animals. I argue that this discrepancy is unjustified. In fact, we should be more cautious in modifying the genes of nonhumans and more bold in thinking about modifying our own genome. I focus on a specific application of genetic technology, germ-line enhancement. I identify four classes of arguments about germ-line enhancement: safety arguments, justice arguments, trust arguments, and naturalness arguments. The first three classes of argument are equally effective for both humans and nonhumans and indicate a need for caution and regulation. The last kind of argument, the naturalness arguments, would indicate a total ban on germ-

line enhancement and apply more strongly to humans than nonhumans. Naturalness arguments, however, fail. Therefore the discrepancy in attitude to human and nonhuman germ-line enhancement is unjustified.

Loftis, J. Robert. 2003. Three Problems for the Aesthetic Foundations of Environmental Ethics. *Philosophy in the Contemporary World* 10 (2):41–50.

This essay takes a critical look at aesthetics as the basis for nature preservation, presenting three reasons why we should not rely on aesthetic foundations to justify the environmentalist program. First, a comparison to other kinds of aesthetic value shows that the aesthetic value of nature can provide weak reasons for action at best. Second, not everything environmentalists want to protect has positive aesthetic qualities. Attempts have been made to get around this problem by developing a reformist attitude toward natural aesthetics. I argue that these approaches fail. Third, development can be as aesthetically positive as nature. If it is simply beauty we are looking for, why can't the beauty of a well-constructed dam or a magnificent skyscraper suffice?

Abstracts

Talks and Works in Progress

“The Right to Genetic Enhancement”

This essay is mostly a critique of two ideas that I believe to be spectacularly bad: the proposal that we ban all genetic enhancement and the alternate proposal that we ban all genetic enhancement save for a few licensed enhancements given to specially authorized individuals. In a series of articles and more recently a book, law professor Maxwell Mehlman considers the proposals, leaning toward the former, but ultimately endorsing the latter (Mehlman 2003). I will argue that either proposal has intolerable implications for civil liberties, in particular requiring invasive bodily searches and constant bodily monitoring. My goal is not simply to block one proposal, however. I will also argue that the failure of this proposal is indicative of larger problems with regulating human genetic technology, and even points to a broad right to genetic enhancement based on the right to bodily integrity and the doctor-patient relationship. I will begin by explaining the relevant ideas and proposals. In the subsequent section I will critique the proposal, and in the final section I will discuss the larger implications.

“Teaching Abortion to the Conservative Christian Student: Moral Status or Sex?”

Most conservative Christian students believe strongly and sincerely that abortion is a profound moral wrong. Most have also been taught to justify this belief by saying that “life begins at conception.” Although it is easy enough to get these students to substitute the more precise “moral status begins at conception,” only a few of the more sophisticated students can actually grasp the concept of a theory of moral status and develop the implicit theory of moral status that justifies their position. In my experience the rank and file have difficulty getting beyond the cheap emotional appeals that dominate the public abortion debate.

I suggest that part of the reason for this is that the argument from the moral status of the fetus is not actually what motivates them. For a significant portion of the conservative Christian students the abortion issue is not about life, but about sex. Using a combination of anecdotal evidence from my student’s essays, some harder sociological data, and the history of the abortion debate over the last 200 years, I paint a different picture of conservative student abortion attitudes. Here the root moral fact is not the moral status of the fetus, but that premarital sex is wrong. When an unmarried woman becomes pregnant, she has been caught doing something wrong. Abortion is an attempt to avoid responsibility for a crime you have very obviously committed. In my experience, many students will claim this “responsibility argument” is compelling, even if they do not think the fetus has moral status.

If I am right, people teaching abortion to conservative Christian students are in a tricky position. The student has radically false ideas about their own motivation for

belief. This is not something you want to just say to someone's face. I conclude by suggesting that teaching the history of the abortion debate is a good way to subtly suggest to students that they do not grasp their own motivations.

THE OTHER VALUE IN THE DEBATE OVER GENETICALLY MODIFIED ORGANISMS

J. ROBERT LOFTIS
ST. LAWRENCE UNIVERSITY

ABSTRACT: I claim that differences in the importance attached to economic liberty are more important in debates over the use of genetically modified organisms (GMOs) in agriculture than disagreements about the precautionary principle. I will argue this point by considering a case study: the decision by the U.S. Animal and Plant Health Inspection Service (APHIS) to grant nonregulated status to Roundup Ready soy. I will show that the unregulated release of this herbicide-resistant crop would not be acceptable morally unless one places a very high premium on economic liberty. This is true even if one takes a sound science attitude to unknown risks, rather than a precautionary attitude. I concede that it may not have been within APHIS's legislative mandate to regulate Roundup Ready soy further, but for those of us who do not put a high premium on economic liberty, this only calls for extending regulatory oversight of GMOs.

I. INTRODUCTION

According to Michael Ruse and David Castle, the 'precautionary principle' is "a cornerstone of biotechnology policy" (Ruse and Castle 2002, 250). The precautionary principle is a rule of prudential reasoning designed to compensate for the perceived recklessness of current methods for making decisions when risks are poorly understood, including cost-benefit analysis. It is explicitly written into

European law but has been kept out of U.S. regulation by lawmakers on the right, who prefer the so-called ‘sound science’ principle. The sound science principle requires that no safety risk be considered in regulation until the causal mechanism that underlies it is thoroughly understood. Because U.S. lawmakers cannot agree on an approach to precautionary issues, regulatory agencies have simply judged genetically modified organisms (GMOs) based on analogies and resemblances to previously known and understood organisms.

The differing approaches to precaution in Europe and the United States have clearly affected the GMO debate. However, I want to highlight the importance of another value at play in this debate, economic liberty. I claim that differences in the importance attached to economic liberty are decisive in deliberations about GMOs. I will argue this point by considering a case study: the decision by the U.S. Animal and Plant Health Inspection Service (APHIS) to grant nonregulated status to Roundup Ready soy. I will show that the unregulated release of this herbicide-resistant crop would not be acceptable morally unless one places a very high premium on economic liberty. This is true even if one takes a sound science attitude to unknown risks, rather than a precautionary attitude. I concede that it may not have been within APHIS’s legislative mandate to regulate Roundup Ready soy further, but for those of us who do not put a high premium on economic liberty, this only calls for extending regulatory oversight of GMOs.

Two caveats: First, this is essentially an exercise in rational reconstruction. I am identifying a premise that must be in place to justify a decision. More empirical sociological methods might yield different conclusions about the values in play in the GMO debate. However, the principle of charity in interpretation—the rule that says we should always be kind to our opponents in reconstructing their arguments—guarantees that this sort of analysis must play at least some role in understanding the debate. Second: I am not opposed to all use of GMOs in agriculture. I am only opposed to using the GMOs that worsen the current problems with the global agricultural system. I actually hope this essay will be a contribution to the discussion of the question “What kind of GMOs should there be?”

II. BACKGROUND

The vast majority—81 percent in 2004—of the genetically modified (GM) crops in the environment right now have been modified to tolerate an herbicide (James 2004). Generally the same company that sells the GM seeds makes the herbicide, and the two are sold as a package. The farmer can thus blanket her crops with the herbicide, knowing that it is likely to only affect the weeds. Although many benefits have been cited for herbicide-resistant crops, their only direct benefit is to increase yields relative to cost. They do this by allowing the farmer to kill more weeds with fewer applications of herbicide. Previously farmers would blanket their fields with a wide-spectrum herbicide before the emergence of their crops, followed by many sprayings using targeted herbicides or delivery methods. With herbicide-resistant crops, farmers can simply use a small number of sprayings of a wide-spectrum

herbicide at any point in crop development. It is worth noting, however, that using fewer applications of herbicide is not the same as reducing the overall amount of herbicide pumped into the environment.

Since 1996, APHIS has handled most of the regulation of GMOs.² APHIS claims jurisdiction over GMOs because they typically contain genes from *Agrobacterium tumefaciens*, the cauliflower mosaic virus, or other known plant pests (APHIS 1987). This policy leads to a couple of oddities. First, ever since the establishment of the “Coordinated Framework for the Regulation of Biotechnology” (Office of Science and Technology Policy 1986), the major complaint against U.S. biotechnology regulation is that it refused to acknowledge any differences between current genetic technology and traditional selective breeding. Yet APHIS is effectively going back on that refusal by using genetic modification to trigger regulatory review. Second, APHIS’s claim of jurisdiction contains a curious piece of genetic essentialism. (Genetic essentialism is the almost superstitious belief that the “true nature” of a thing can be found only in its genes.) Often the genetic material taken from the known pest consists only of promoter or stop sequences, short statements of genetic code that say “start reading here” or “stop reading here.” The meaning of such statements, and hence their danger, will have much more to do with the context they are placed in than the context they came from.

In any case, once a GMO falls under APHIS’s jurisdiction, the seed company generally asks that APHIS grant the product “nonregulated status,” which relieves it of all further oversight. Essentially, APHIS declares that it didn’t really have jurisdiction after all. Among other things, this absolves the GMO of all postcommercialization monitoring to see what an organism actually does when it is released into the wild. One of the most pervasive unmonitored GMOs is Monsanto’s Roundup Ready soy, which was granted nonregulated status in 1994 (APHIS 1994a, 1994b, 1994c). Roundup Ready soy is the herbicide resistant counterpart to Monsanto’s flagship herbicide, Roundup. The farmer buys Roundup and Roundup Ready soy together, knowing that the Roundup will kill all the plants in her field besides the Roundup Ready soy. Roundup is a common weedkiller, available to ordinary consumers in hardware stores. Its active ingredient is glyphosate, which blocks an enzyme used in photosynthesis. Glyphosate is benign by herbicidal standards. It is water soluble, so that it does not lodge itself in animal tissues and accumulate as it works its way up the food chain, the way DDT does. It also disperses quickly, so that no traces can be found in the soil a week after spraying. Nevertheless, there are good reasons why the Roundup in the hardware store carries warning labels. Glyphosate itself can damage the liver of mammals (Chan and Mahler 1992). More important, Roundup contains the surfactant polyoxyethyleneamine (POEA), which helps the herbicide spread more evenly. It also can kill you. The twenty people known to have died from directly ingesting Roundup (all probable suicides) were killed by the POEA (Sawanda et al. 1988; Tominack et al. 1991).

When Monsanto petitioned to have Roundup Ready soy deregulated, they submitted results from nine field trials. Thirty-three letters of public comment were

also solicited by APHIS in the *Federal Register*. In their response to Monsanto's petition (APHIS 1994c), APHIS made five findings: (1) neither the Roundup Ready gene construct nor its products pose a plant pest risk, (2) Roundup Ready soy has "no significant potential to become a weed," (3) Roundup Ready soy will not increase the weediness of plants it can breed with, (4) Roundup Ready soy will not damage processed agricultural products, and (5) Roundup Ready soy will not harm beneficial organisms. Given these five findings, APHIS determined that Roundup Ready soy was not a plant pest, so it did not fall under their jurisdiction and would not be subject to any further regulation.

III. THE COST-BENEFIT ANALYSIS: WHAT BENEFIT?

In their deliberations, APHIS failed to consider many of the environmental risks posed by Roundup Ready soy at all and treated other risks inadequately. All of these risks are compounded by the lack of postcommercialization monitoring. Furthermore, unless you put a premium on economic liberty, the widespread use of Roundup Ready soy has no direct redeeming benefits.

APHIS did not consider any possible risks from the changing patterns in the use of glyphosate, seeming to take for granted the assertion by the petitioners that Roundup Ready soy would decrease herbicide use and that this would be a guaranteed environmental gain. However, as Brian Johnson and Anna Hope point out (Johnson and Hope 2000), the net effect of herbicide use has as much to do with timing and application methods as it does volume of herbicide used. In this regard, Roundup Ready soy looks dangerous. Farmers who use Roundup Ready soy are more likely to set spray nozzles high or even use aerial spraying, increasing pesticide drift (Johnson and Hope 2000; Lappé and Bailey 1998). The environmental impacts of glyphosate itself are still unknown. It is known to disrupt the soil's microflora, but the long-term impact is unknown (Lappé and Bailey 1998, 80). Overall effects on biodiversity in farmed areas are also unknown (Johnson and Hope 2000). And because soy products are used in animal feed, glyphosate can wind up in the human food supply (Lappé and Bailey 1998).

Two other risks not considered at all are the pleiotropic and position effects of gene insertion. It is well known that genes have multiple effects (pleiotropy) and that these effects are determined by the position in the genome (position effects). But when Monsanto asked to have Roundup Ready soy deregulated, they provided no information about where the Roundup Ready gene construct landed. They could show which portions of the construct were incorporated into the soy genome, and that these portions were inherited in a Mendelian fashion, but the information necessary to evaluate pleiotropic and position effects was not available (APHIS 1994c). Thus there was no way to know what else the Roundup Ready construct did to the soybean besides confer Roundup resistance, again entailing unknown risks.

APHIS also did not adequately consider the risk that Roundup Ready genes might find their way into the soybean's wild and weedy relatives, *glycine soya* and *glycine gracilis* (APHIS 1994b, 6). These plants only grow wild in Asia, but APHIS

is required by law to consider the global impact of their decisions. Since many other countries base their regulation in part on U.S. regulation, and the existence of one deregulated market can spur the creation of other black markets, this mandate is well conceived. APHIS made a token effort to consider global effects of their decision in their environmental impact statement by mentioning the existence of international and Asian regulatory agencies and asserting without justification that these agencies could handle any problems that arise (APHIS 1994b). Unfortunately, many Asian governments, especially China, ignore or fail to enforce international intellectual property laws. Pirated seeds could easily become as common as pirated CDs and DVDs and Rolex knockoffs.

Postcommercialization monitoring would help with all of these issues. While many of these risks depend on mechanisms that are well understood—for instance, pollenization—we need large-scale monitoring to measure the effect in this instance. For instance, while there have been plenty of reports of genes from GMOs appearing in wild organisms, there is no general consensus on how likely this is to occur. In 2002 the National Research Council recommended a system for postcommercialization monitoring for GMOs, which have not been implemented (National Research Council 2002). A 2003 report commissioned by the Pew Initiative on Food and Biotechnology argued that none of the agencies involved in biotech regulation were prepared to perform the kind of postcommercialization monitoring needed to achieve the “traditional objectives” of those agencies (Taylor and Tick 2003). Unless we examine the outcome of our actions, we risk repeating mistakes indefinitely.

So there are real environmental risks here; how do they stack up against the benefits? The only *intended* benefit of Roundup Ready soy is to increase yields relative to costs. Other benefits are frequently mentioned by GMO advocates. Half of the letters sent to APHIS during the public comment period suggested that farmers using Roundup Ready could move to no-till agriculture, and several others emphasized the possible decrease in the total amount of pesticides put into the environment (APHIS 1994c). However all of these benefits are speculative at best. The product will not succeed or fail depending on whether it increases no-till agriculture, no efforts have been made to tie the use of this product to no-till agriculture, and indeed we may never know if it increases no-till agriculture. Thus, the focus of our cost-benefit analysis must be on the benefit of increasing yield relative to cost. But here is where the real head scratching begins: Does the world really need cheaper soybeans? While some farmers may try to use the decreased costs to increase their profit margins, competition will quickly force them to drop prices. This effect is positively pernicious in a market where prices are already depressed due to overproduction. According to the Food and Agriculture Organization of the United Nations (FAO), in 1961 the United States produced 18,468,000 metric tons (Mt) of soy. By 2002, that number had more than quadrupled to 85,483,904 Mt (FAO 2005). This is actually less than the total world increase, which is more than sevenfold (FAO 2005). Population growth only puts a dent in the force of this number, since

the world population has merely doubled since the 1960s. There has also been a great deal of increased demand due to increased consumption of heavily processed junk food. Nevertheless, the price of soy has been plummeting: In 2000, the price was about 40 percent of what it was in 1972 (World Bank 2000, 56). As a result of this, soy farmers are now heavily dependent on subsidies. Between 1995 and 2004, the U.S. federal government paid out \$13,017,619,420 in soybean subsidies (EWG 2005). As Kerschenmann (2003) has pointed out, the economic effects of Roundup Ready soy present the same conflict between individual and group rationality seen in arms races. It is rational for an individual farmer to use Roundup Ready soy, because she will be able to underprice her competitors. However it is not rational for every farmer to adopt Roundup Ready soy, because they will only further reduce prices for a product that already has weak demand. Widespread use of Roundup Ready soy will likely simply increase dependence on subsidies.

What about Third World starvation? Supporters of GMOs love to say that they are necessary to feed the 800 million people who are chronically malnourished worldwide. Superficially, it seems like all these soybeans would help, since each year between 30 and 40 percent of them are exported (EWG 2003). The problem is that starvation is not correlated with the underproduction of food, and is rarely caused by it (Sen 1981, 1999). This is shown most clearly in Amartya Sen's work on famines. Sen has shown that famines occur when food production is at its peak, and food production can drop as much as 70 percent in a poor region without triggering a famine (Sen 1999). Famine is caused not by an absence of food in a region but by difficulty accessing that food, often by a particular economic class. In many of the most notorious famines, a particular group went hungry because of a drop in the value of their product relative to the price of staple grains. For instance, in the Bengali famine of 1943, fishermen starved because of a drop in the price of fish relative to rice (Sen 1981, 1999). Something similar can happen if the price of soy drops precipitously. So, as Nottingham (1998) points out, the use of GMOs by First World farmers is likely to increase starvation by undercutting the incomes of Third World farmers.

The main people who stand to benefit from Roundup Ready soy are the employees, executives, and shareholders of Monsanto. There is one other group that benefits a little, though. Farmers get to exercise their economic liberty by purchasing a product of their own free will, which they will need to keep up with the increased production of their neighbors. Let's look at this value in more depth.

IV. THE ROLE OF ETHICAL PRINCIPLES IN THIS ANALYSIS

People who write about the role of values in the GMO debate tend to focus on the precautionary principle, which is written into law in various forms in Europe, and the alternate sound science principle, which has been adopted by American policymakers. Neither of these principles, however, can make sense of APHIS's decision regarding Roundup Ready soy. I claim that this decision only makes sense if it was motivated by a strong concern for economic liberty. An important factor

here is that the precautionary principle and the sound science principle have been given so many different formulations that it is hard to tell what is really being argued over anymore. In fact, it is hard to even distinguish the principles from one another unless you assume that the partisans are making different assumptions about economic liberty.

The precautionary principle is supposed to provide guidance for decision making under scientific uncertainty and is supposed to mandate more caution than ordinary cost-benefit analysis would require. Beyond this general goal, however, there is no agreement about what the precautionary principle says. Neil Manson, in his analysis of various formulations of the precautionary principle, suggests a general logical structure that they all share (Manson 2002). Every formulation specifies a possible negative outcome, a degree of certainty about that negative outcome occurring, and an action that should be taken to avoid the negative outcome. For instance, one popular version of the precautionary principle is the catastrophe principle, which says that when the negative outcome is catastrophic, and the chance of it occurring is small but cannot be ruled out, then any activity that might lead to the outcome should be stopped. The first test of the atomic bomb would have been a nice place to employ this principle: there was a small risk, which could not be ruled out, that the bomb would ignite the atmosphere and incinerate the Earth. The catastrophe principle would bar the atomic test in these circumstances. Not all versions of the precautionary principle are concerned with catastrophe, however. The version of the precautionary principle in the Rio declaration, for instance, merely talks about damages that are “serious or irreversible.”

Because the formulations of the precautionary principle have little in common besides a logical structure, the alternatives to the precautionary principle are hard to specify. While the precautionary principle has been contrasted with the sound science principle and with standard cost-benefit analysis, the logical structure is actually compatible with both of them. For instance, the precautionary principle could say: “If the possible damages are worth x (in dollars), and the probability of those damages is y (on a scale of 0 to 1), subtract $x(y)$ from the benefit of the project.” Indeed, many of the more reasonable formulations of the precautionary principle say little more than this. This option is open in part because, although the focus of debate about the precautionary principle has been scientific uncertainty, there is no reason that the probabilities involved in the second condition be epistemic. Even the sound science principle promoted by industry advocates can also be put in the logical form of the precautionary principle. The sound science principle is generally taken to say, “Only act to avoid a risk when the causal mechanism underlying the risk is understood.” This is a stricture on the probability portion of the precautionary principle, saying that the chance has to be well characterized.

The sound science principle suffers from the same vagueness as the precautionary principle. Chris Mooney, an activist journalist, traces popularization of the sound science approach to the formation of The Advancement of Sound Science Coalition (TASSC) in 1993 (Mooney 2005). Although TASSC claimed to be a

grassroots organization interested in science policy in general, internal documents from Phillip Morris reveal that TASSC was created by the tobacco company with the help of the public relations firm APCO with the specific goal of discrediting reports of the dangers of secondhand smoke. In the hands of the tobacco industry, sound science was not so much a principle as a strategy. Mooney suggests that the strategy is best summarized in the much earlier notes for an internal presentation at Brown and Williamson, which were made public as a part of tobacco litigation: "Doubt is our product, since it is the best means of competing with the body of fact that exists in the minds of the general public. It is also the means of establishing a controversy." (Brown & Williamson 1969, quoted in Mooney 2005, p. 67)

It would be unfair to leave the rhetoric of sound science as it stood in the hands of the tobacco industry. As I have said, it can be rendered in the same logical structure as the precautionary principle. Phrased this way, it is essentially an attempt to loosen the restrictions of caution by saying that a high level of confidence in the negative outcome must be established before the preventative action may occur. One can already see the value of economic liberty at work in the justification of this principle. A background assumption in this debate is that the "preventative action" is an action by a government to restrict some form of industry. That is certainly the form that the action takes in this debate, since we are considering whether the U.S. government should allow Monsanto to pursue its business plans. But why raise the standard of evidence, across the board, for any government action? The obvious justification, close to the lips of all promoting sound science, is that companies like Monsanto have a strong *prima facie* right to do business as they please. Conversely, those who want to tighten the restrictions of caution assume that Monsanto's economic rights are quite weak.

The problem is that simply adjusting the probability portion of the precautionary principle is not enough to justify APHIS's action in the case of Roundup Ready soy. There are negative outcomes with probabilities greater than zero involving mechanisms like crossbreeding whose workings are well understood. There is no net benefit to the use of these crops. On any formulation of any of the above principles, the use of Roundup Ready soy is an unjustified risk.

To really justify APHIS's decision, you must appeal directly to the principle behind the sound science principle, the principle of economic liberty. A libertarian understanding of economic liberty supports APHIS's decision three ways. First, it implies that deregulation of Roundup Ready soy automatically brings about at least one good result, since economic liberty is itself a good. Second, it blocks my claim that the market for soy is so glutted that further production of soy would not be a good, because the free market is the only legitimate mechanism for determining when too much of a product is being produced. Finally, it blocks considerations of many of the long term potential harms of Roundup Ready soy as illegitimate attempts at social engineering.

The first piece of support for APHIS's decision comes because the economic freedom is now an intrinsic good. The exchange between Monsanto and individual

farmers is, as Robert Nozick would put it, a free act of capitalism between consenting adults (Nozick 1974). Moreover, this free act is no less important to our well being than our freedom of speech or our freedom to choose our romantic partners. Indeed, for some libertarians, economic liberty becomes central to all other liberties: "Economic control is not merely control of a sector of human life which can be separated from the rest; it is the control of the means to all our ends" (Hayek 1944, 92). In the spirit of Mill's *On Liberty* we can say that the state should only interfere with such acts to prevent direct harm to others or the significant risk of such harm. This argument may not be enough to justify APHIS's decision, though, because there Roundup Ready soy does pose potential harm to others. Fortunately for the economic libertarian, there are other factors bolstering APHIS's decision.

The economic libertarian can also claim that a further lowering of prices is also a positive outcome, even though the market for soy seems to be glutted. She can claim this because she believes the only legitimate method for determining how much of a product should be produced is whether sellers can find a market for it. We will know when there is too much soy on the market because farmers won't be able to stay in business selling it. The gap between the individual and collective self-interest of farmers which Kerschmann described should really be lauded as the source of our affluence, as competition to increase production and lower prices is a part of the genius of modern society. If farmers acted in their collective self-interest to limit production, they would be forming an anticompetitive cartel. A group decision to avoid Roundup Ready soy because increasing production would have no benefit would be similarly anticompetitive. The libertarian would also say that my dismissive description of much of the increased demand as coming from the rise of "junk food" amounts to an elitist sneer at other people's preferences. If the world wants more junk food, then providing it for the world would be a good thing. Concerns that further production of soy would increase famine by undercutting the ability of Third World farmers to sell their product are similarly misplaced. The decline of Third World farming is simply the transfer of production to the regions that can do it most efficiently. There is one problem with the current global soy market the libertarian would acknowledge: the existence of huge subsidies. If there is a glut of soy, it is because subsidies prevent the pricing mechanism from doing its work. But the solution then would be to remove the subsidies, not to block new technology.

Finally, the economic libertarian can dismiss many of the risks I described as illegitimate attempts at social engineering. Many of the risks discussed, such as the risks involved with increased use of Roundup, assume large-scale adoption of Roundup Ready soy. But in considering limiting freedom on the basis of potential harms, one should only look at immediate harms to identifiable individuals. The long-term and large-scale harms and benefits of an action are too complicated for an individual planning agency to predict. It thus must be left to the free market, with its ability to aggregate the values and opinions of the whole society, to decide how to deal with such big picture issues.

Although APHIS did not make an explicit appeal to the value of economic liberty, much of this libertarian style argument is implicit in the APHIS rulings (1994b, 1994c). APHIS made its decision by looking at the immediate circumstances. The benefits considered were all benefits to the individual farmer using Roundup Ready soy. Whether there was a pressing need for cheaper soy was apparently not something they were authorized to consider. Similarly, the only concern considered was the possibility that Roundup Ready soy might be a plant pest. In response to a public comment about the need to change patterns of pesticide use, APHIS claimed that such goals are beyond their jurisdiction. This last point may actually be true. Indeed, the libertarian premises behind APHIS's reasoning may in general be a feature of their legislative mandate, and not ideological. But for those of us opposed to economic libertarianism, this merely points to the need to expand the mandate of regulators.

ENDNOTES

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1 The Environmental Protection Agency (EPA) does have jurisdiction over plants that produce their own pesticides and has enacted some restrictions. Unfortunately, EPA turns over all enforcement of its regulations to the Food and Drug Administration, which effectively leaves the regulations unenforced (Taylor and Tick 2003).

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J. Robert Loftis

Germ-Line Enhancement of Humans and Nonhumans

ABSTRACT. The current difference in attitude toward germ-line enhancement in humans and nonhumans is unjustified. Society should be more cautious in modifying the genes of nonhumans and more bold in thinking about modifying our own genome. I identify four classes of arguments pertaining to germ-line enhancement: safety arguments, justice arguments, trust arguments, and naturalness arguments. The first three types are compelling, but do not distinguish between human and nonhuman cases. The final class of argument would justify a distinction between human and nonhuman germ-line enhancement; however, this type of argument fails and, therefore, the discrepancy in attitude toward human and nonhuman germ-line enhancement is unjustified.

People have widely disparate attitudes toward human and nonhuman genetic engineering. This discrepancy is clearest in North America. Most varieties of genetic intervention in humans receive attention in the popular press, are thoroughly analyzed by professional ethicists, and are approached by scientists with a great deal of caution. Meanwhile all kinds of genetic intervention in nonhumans, including genetic engineering, is proceeding on an industrial scale in North America with spotty notice in the popular press, little criticism from professional ethicists, and arguably little regulation by the government. Admittedly, many environmental groups have launched campaigns against genetically modified organisms (GMOs), but they have not captured the attention of the mainstream public. The situation is different in Europe, but even there one finds a discrepancy in attitude toward human and nonhuman genetic modification. Although there is opposition to the genetic engineering of nonhumans, the genetic engineering of humans is looked upon with genuine dread.

I argue that a serious examination of the risks and benefits of genetic technologies will show that this gap in attitude is unjustified. We should exercise far more caution in altering the genes of nonhumans, and be more bold in altering the genes of humans. I begin by outlining in more specific terms what technologies are in question, what moral distinctions are made, and what the prevailing attitudes are. I then divide the arguments typically brought against genetic engineering in humans and nonhumans into four classes: safety arguments, justice arguments, trust arguments, and naturalness arguments. I show that the first three classes of arguments are moderately effective. These cogent arguments signal a need for great caution and apply equally to humans and nonhumans. In the case of nonhuman genetic engineering, they signal a need for more caution than is currently being exercised in North America. Things are different when it comes to the “naturalness arguments.” These arguments, I believe, lie behind the difference in our treatment of human and nonhuman genetic engineering. People, especially Americans, feel the pull of naturalness arguments more strongly when it comes to humans. Moreover, this kind of argument generally leads to outright prohibition, rather than close regulation. The problem is that naturalness arguments all fail. No members of the class are cogent. I conclude that our policies towards genetic engineering need to be reshaped.

LAY OF THE LAND

By genetic engineering I mean any member of a family of protocols that includes the following techniques: direct or vector-mediated insertion of DNA, gene surgery, or mutagenesis. This definition is meant to capture the sorts of genetic alterations that are more efficient at altering a species and more targeted to altering specific genes than ordinary selective breeding.

The form of genetic engineering on which I focus is *germ-line enhancement*. A form of genetic engineering is called “germ-line” if it affects the sex cells and thus can be passed on to future generations. Otherwise it is called “somatic cell” engineering. A form of genetic engineering is called “enhancement” if it alters a trait that is within the norm for the organism and changes it to a superior position within the normal range of variation or moves it beyond the norm altogether. The remarkable thing about germ-line enhancement is that it is the most ethically suspect of all the categories of genetic engineering in humans, yet it is the *preeminent* kind of genetic engineering practiced on nonhumans. Regulators in the U.K., fol-

lowing the recommendations of the Committee on the Ethics of Gene Therapy (1992), simply forbid both human germ-line engineering and human enhancement engineering (GTAC 2002). The Council of Europe in 1999 declared that human germ-line and enhancement engineering were offenses to human dignity and banned them in all signatory countries (COE 1999). Although its findings do not have the status of law, a government bioethics board in Canada reached the same conclusion (Royal Commission on New Reproductive Technologies 1993, pp. 931, 938, 345). In the U.S., a commission funded by the American Association for the Advancement of Science reluctantly concluded that circumstances may exist in which human germ-line engineering would be acceptable, but the group was adamant that it be restricted to treatment, not enhancement (Frankel and Chapman 2000, p. 42). Similarly, the Human Genome Project had a ban on all human germ-line engineering projects (McGee 2000, p. 30). Standard undergraduate bioethics textbooks inform students that germ-line engineering is more problematic than somatic cell engineering and that engineering aimed at enhancement is more problematic than that aimed at treatment (Munson 2000, p. 591; Mappes and DeGrazia 2001, p. 515). Although the germ-line enhancement of humans is regarded with profound dread, it is essentially the only form of genetic engineering being performed on nonhumans. No one would bother genetically engineering an agricultural animal or plant if the alteration must be repeated every generation, and no one would use such an expensive technique to restore to health an organism that simply can be destroyed and replaced.

My chief example of germ-line enhancement in nonhumans is the use of herbicide-resistant plants in agriculture, such as the Roundup Ready line or BXN cotton. Generally the same company that sells the GM seeds also makes the herbicide, and the two are sold as a package. The farmer can thus blanket her crops with the herbicide, knowing that it is likely to affect only the weeds. This is by far the most common GMO, accounting for 83 percent of GM crops worldwide (James 2002). Although many benefits have been cited for herbicide-resistant crops, their only direct benefit is to increase yields relative to cost. They do this by allowing the farmer to kill more weeds with fewer applications of herbicide.

With respect to humans, I focus on two germ-line enhancements that affect the body: the retardation of natural aging and the general improvement of the immune system. It is not difficult to imagine a germ-line enhancement that slows or arrests natural aging, for instance by improving the body's ability to break down free radicals, or somehow altering cell

senescence (see Walters and Palmer 1997, p. 103; Rose 2000). Similarly, one easily can imagine the possibility of altering the immune system so that it is better overall at identifying and eradicating foreign agents. As LeRoy Walters and Julie Palmer (1997, p. 110) point out, we already do this in a nongenetic way when we immunize our children against diseases. (We do not like to think of immunization in children as a form of enhancement, because it fits the typical medical goal of fighting disease. It nevertheless is an enhancement, because it raises human functioning above the species-typical level.)

I would be happy to see either of these alterations become commonplace in humans. Life expectancy at birth already has tripled since the Upper Paleolithic (Diamond 1987), and I welcome the next tripling. I am quite worried, however, about the use of herbicide resistant crops, which I think will make a bad global food market worse. To see how I arrive at such an inverted worldview, we need to examine the arguments typically raised around germ-line enhancement.

SAFETY ARGUMENTS

Real safety concerns exist for the use of all the technologies I am discussing; these concerns are equally strong for both human and nonhuman germ-line enhancement, and they indicate a need for close regulation, rather than a ban. In the case of nonhuman germ-line enhancement, the safety risks indicate a need for more caution than is currently being exercised in North America.

There are three main categories of risk in nonhuman germ-line enhancement: concerns about the safety of consumers, concerns about the safety of the environment, and concerns about the welfare or rights of transgenic animals. It is important to note, however, that there are also potential benefits in all these categories. Foods can be altered to be healthier. Gary Comstock (2000) points out that one widely consumed GMO, bt corn, actually may be more healthy than traditionally bred corn because it is less likely to grow mold during shipping. Use of transgenic crops also can benefit the environment by reducing the amount of pesticides sprayed on fields and reducing the acreage needed to farm. Finally, farm animals can be altered in ways that improve their standard of living. Bernard Rollin (1995, p. 170) points out that all cattle could be engineered with the poll gene, which currently is found only in some species, and which keeps them from growing horns. This would obviate the need for painful and bloody dehorning procedures, which are generally done without anesthesia.¹

Nevertheless, the array of situations in which safety concerns arise is gigantic. Space considerations prevent me from offering an opinion on every release of transgenic organisms. Instead I will argue by example. I claim that the U.S. Animal and Plant Health Inspection Service (APHIS) should not have granted nonregulated status to Roundup Ready soy. Roundup Ready soy poses real risks and, more importantly, offers virtually no benefits.

Since 1996, APHIS has been the point agency for the environmental regulation of GMOs. APHIS bases its jurisdiction on the fact that most GMOs contain genes from an organism already listed as a plant pest, typically a promoter sequence from the cauliflower mosaic virus or genes from *Agrobacterium tumefaciens*, which is used as a vector and a source of stop sequences (APHIS 1987). Anyone who wishes to market a GMO in the U.S. at least must notify APHIS of the intention to do so. At this point, the seed company generally asks APHIS to grant the product nonregulated status, which absolves it from all future oversight. This includes all postcommercialization monitoring, which means that no effort is made to follow the crop once it is introduced to the environment to see if it is as safe as regulators thought.

In 1993, Monsanto requested that its Roundup Ready soybean be granted nonregulated status (APHIS 1994a, 1994b, 1994c). The plant is designed to resist glyphosate, the active ingredient in Monsanto's Roundup herbicide. Glyphosate is a good herbicide, as herbicides go. It breaks down quickly in the environment and does not bioaccumulate as it goes up the food chain the way DDT does. The primary effect of glyphosate is on photosynthesis, which obviously does not impact animals. However, experiments with rats "suggest a mild toxicity" to the liver system (Chan and Mahler 1992). More importantly, Roundup contains the surfactant polyoxyethyleneamine (POEA) to make it spread more evenly. POEA has been linked to the deaths of 20 people who ingested herbicides directly (Sawanda et al. 1988; Tominack et al. 1991).

APHIS granted Roundup Ready soy nonregulated status based on information from nine field trials reported by Monsanto and 33 letters of public comment solicited by APHIS in the *Federal Register*. APHIS determined that Roundup Ready soy was not a plant pest and therefore did not fall under their jurisdiction and would not be subject to any further regulation.

Roundup Ready soy poses many environmental risks that were considered inadequately or not at all by APHIS. Many risks involve high amounts of scientific uncertainty and are compounded by the fact that there is no mechanism for monitoring the effects of a GM crop after it is on the

market. One class of risks APHIS did not consider at all comes from the long-term increased use of glyphosate, including the unprecedented aerial spraying of glyphosate (Lappé and Bailey 1998, p. 40). Glyphosate is known to disrupt the soil's microflora, killing some organisms and causing others to proliferate wildly. What long-term use of it means for the microbial environment is not known (Lappé and Bailey 1998, p. 80). Glyphosate also can enter the human food supply, largely through the use of soy products in animal feed (Lappé and Bailey 1998, p. 80). A second category of risks not considered at all involved the pleiotropic and position effects of gene insertion. It is well known that genes have multiple effects (pleiotropy) and that these effects are determined by the position in the genome (position effects). There is no way to know what else the Roundup Ready construct did to the soybean besides confer Roundup resistance, again entailing unknown risks.

APHIS did consider the possibility that Roundup Ready soy might interbreed with its wild and weedy relatives, *Glycine soya* and *Glycine gracilis* (APHIS 1994b, p. 6). Because *G. soya* and *G. gracilis* only grow wild in Asia, the risk in question comes from the spread of Roundup Ready soy outside U.S. borders. APHIS, however, is required by law to consider the impact of deregulation in the U.S. on the spread of a GMO elsewhere. APHIS's efforts to fulfill this mandate were token, at best. In their environmental impact statements, APHIS (1994b) simply pointed to the existence of international and Asian regulatory agencies and asserted that they would be adequate to the task of preventing the spread of Roundup Ready soy to areas where gene pollution is a threat. However, many Asian nations have shown a willingness to flout international intellectual property agreements, and it is entirely possible that trade in pirated seeds will become as common as trade in pirated CDs.

Scientific unknowns obviously play a large role in many of these issues, which makes the lack of postcommercialization monitoring troubling. For instance, we could learn something about where the Roundup Ready gene construct landed by watching how the crops behave over many generations on a large scale. We are not doing this. We could discover something about the spread of transgenes to related organisms all over the globe if we were looking for those transgenes. We are not doing this either. The National Research Council (NRC 2002) has recommended a system of postcommercialization monitoring for GMOs, and it is hard to disagree with their suggestions. Unless we examine the outcome of our actions, we risk repeating mistakes indefinitely.

Of course, any cost-benefit analysis must include a discussion of benefits. What, then, does Roundup Ready soy offer the world? Roundup Ready soy was designed to increase production relative to costs. Now, although some farmers may try to use the decreased costs to increase their profit margins, competition quickly will force them to drop prices. This effect is pernicious in a market where prices are already depressed due to overproduction. Worldwide per capita soy production has increased 93.8 percent in the last 50 years (FAO 2003). Anyone with a little high school economics realizes that this means the price of soy should be down, and indeed it is: the price of soy has been cut roughly in half since 1970 (World Bank 2000). Frederick Kerschenmann (2003) and others point out that although it is rational for an individual farmer to plant Roundup Ready soy, because she will gain an advantage over her neighbors, it is not rational for farmers collectively adopt its use. Once everyone is using the Roundup Ready system, the only way to support farmers income will be to increase federal subsidies, again.

One might protest that the benefit of decreased production costs was not meant to benefit farmers, but rather consumers, either in the First World or the Third World. I will set aside the issue of the Third World food supply until the section on justice arguments, below. Regarding First World consumers, I need note only that there is a reason that prices for soy are depressed. Supply already far exceeds demand.

The intended effect of Roundup Ready soy is basically pernicious. Other benefits have been touted for it, however. APHIS (1994c), in granting Roundup Ready soy nonregulated status, cited two possible benefits of note: (1) by allowing farmers to use Roundup after emergence, and to use fewer applications of Roundup, Roundup Ready soy may reduce the net amount of pesticide released into the environment; (2) Roundup Ready soy may allow farmers to reduce erosion by switching to low-till or no-till agriculture. The problem with these two potential benefits is that their likelihood has not been researched thoroughly, simply because they are not the intended outcome of the genetic modification. Both of these outcomes depend not only on the product being adopted, but on other courses of action being taken by consumers, yet no market research has been done to see whether farmers will behave this way.

I conclude that we are taking at least some unjustified risks in the regulation of GM crops. Furthermore, I claim that this example is representative of much of the genetic modification that is going on today. Safety arguments indicate a need for greater caution and regulation in the use of GMOs, but not a ban.

The situation is different for human genetic engineering. Here there are obvious safety concerns. Human genetic engineering, in the form of somatic cell treatment, has killed a person (Savulescu 2001) and induced cancers in others (Kaiser 2003). These risks become more pronounced when one moves to germ-line enhancement. Attempting to extend life by tinkering with cell senescence poses an obvious cancer risk, while general immune system enhancements pose the risk of autoimmune disorders. Nevertheless, there are categories of risk that are present for nonhumans that are not present for humans, including dangers to the environment. Also, the sheer scale of the nonhuman alterations creates risks that will not be present in humans. On the whole, there is no qualitative difference to be drawn. Therefore the response should be the same: adequate regulation.

The real difference between the two loci for germ-line enhancement is the safety mechanisms that are clearly in place when it comes to human germ-line enhancement. The front line of regulation is an institution that does not even exist in the agricultural companies engaged in nonhuman genetic engineering: the institutional review board (IRB). The FDA and the Recombinant DNA Advisory Committee (RAC) at the National Institutes of Health provide additional regulation. What is most interesting about the regulation of human biotechnology is the serious weight given to the unpredictable nature of genetic alterations: “Both the RAC and the scientific community have gone to unprecedented lengths to assess and minimize both the risks of ‘insertional mutagenesis’ involved in the delivery and integration of exogenous DNA into the subjects cells . . . even when the risks seem quite remote” (Juengst and Walters 1999). Advocates of nonhuman GMOs, by contrast, do not even like to admit that they are in less than full control of the process.

It often is alleged that proper consent never can be obtained for human germ-line enhancement, because the person whose genes are altered does not exist at the time the decision is made to alter them and because the germ-line alteration affects all future generations (Lappé 1991; Munson and Davis 1992). Both of these problems can be overcome and, for the most part, are addressed by current regulation. The issue of the consent of the subject can be handled in the same way as other forms of experimental fetal treatment. The experiment is justified when there are good animal models, when the subject has a reasonably likelihood of benefiting from the procedure, and when proxy consent is given by the guardian. IRBs exist to ensure all these things. The problem of future genera-

tions also is not insurmountable. Again, good animal models and a reasonable likelihood of benefiting future generations are required. It would be useful as well to have some kind of proxy consent, a point that is not addressed by current regulation.

Nonhuman germ-line enhancement, on the other hand, fails to live up to reasonable ethical standards regarding consent, because GM food remains unlabeled, at least in North America. One legitimately might choose not to consume GM food out of concern for one's own health, the health of the environment, or the welfare of transgenic animals, as well as because of one's religious views —e.g., because one's religion forbids sowing fields with different kinds of seed. This option is not available as long as GM food remains unlabeled.

The conclusion I draw for both human and nonhuman germ-line enhancement is that the safety concerns are real, and the technologies require close regulation. This means dramatically reigning in current practices regarding modifications of nonhumans. The same safety concerns apply to human germ-line enhancements. Here at least the proper regulatory institutions are in place. Whether they are up to the task has yet to be seen.

JUSTICE ARGUMENTS

The concept of justice appears in different forms in nonhuman and human germ-line enhancement. The most prominent justice arguments in nonhuman genetic engineering are essentially applications of the difference principle: that special duties are owed to the world's worst off. Advocates of genetic engineering in agriculture, including the George W. Bush administration, frequently claim that it will benefit the Third World poor (Becker 2003; Sanger 2003). Certainly there are a variety of individual projects that clearly would benefit the world's worst off, such as the use of transgenic insects to wipe out insect-borne diseases. But these projects are atypical. As with the safety arguments, one needs to look at the example of herbicide-resistant crops, which are far more representative. Advocates of genetic engineering in agriculture consider the current efforts to increase production to be an extension of Norman Bourlag's "Green Revolution" (Pence 2002, p. 159) that is said to have saved 100 million lives by introducing high-yield crops to Third World countries. For the sake of argument, assume that the Green Revolution was all it is cracked up to be. Will the genetic revolution do the same? There are two questions here: (1) Will GM crops boost production relative to costs for poor farmers in the developing world? (2) Will a boost in production

relative to cost for wealthy farmers benefit people in the developing world? The answers are “no” and “no.”

The most straightforward reason transgenic crops will not improve production in the developing world is that they are not being marketed there. In 2002, four countries accounted for 99 percent of the GM crops grown by acreage: the U.S. (66%), Argentina (23%), Canada (6%), and China (4%) (James 2002). Both critics and supporters of agricultural biotechnology agree that this stems in part from the lack of interest biotech companies have in other markets. They are interested in wealthy farmers “with an ability to pay for the extensive infrastructure needed to support transgenic crops” (Lappé and Bailey 1998, p. 88; see also, Paarlberg 2001, p. 3). There have been some moves recently to market GMOs in the Third World, as nations like China join the GMO club (Barboza 2003). However, these GMOs are marketed to the wealthy large-scale farmers in these countries who function essentially like First World farmers. Furthermore, the major trade initiatives have involved the export of GM food from the U.S., not the export of seed.

So, if common forms of biotechnology will not boost productivity for poor farmers, will a boost in productivity for wealthy farmers benefit the poor in the developing world? Superficially, a move like the introduction of Roundup Ready soy to U.S. farmers would help the Third World poor, since about 35 percent of U.S. soybeans are destined for export (Environmental Working Group 2003). But as Amartya Sen (1981; 1999) has demonstrated thoroughly, starvation is not correlated with the underproduction of food, and is rarely caused by it. The case is clearest with incidents of famine. Famines can occur when food production is at its peak, and food production can drop as much as 70 percent in a poor region without triggering a famine (Sen 1999). What matters is people’s access to food. In many of the most notorious famines, starvation occurred among a particular economic class because of a drop in the value of their product relative to the price of staple grains. One common way for this to happen is for prices of commodity crops like soybeans to drop precipitously. For instance, in the Bengali famine of 1943, fishermen starved because of a drop in the price of fish relative to rice (Sen 1999). So, as Nottingham (1998) points out, the use of GMOs by First World farmers is likely to increase starvation by undercutting the incomes of Third World farmers.

To deal with justice issues in human germ-line enhancement, I take both my conceptual framework and my basic arguments from Allen Buchanan and his colleagues (2000). Buchanan and colleagues split the

justice arguments surrounding human genetic enhancement into issues of distributive justice and the morality of inclusion. The distributive justice arguments center, obviously, on how germ-line enhancements should be distributed (see, e.g., Lappé 1991 or Munson and Davis 1992). The morality of inclusion arguments ask how the unenhanced or differently enhanced will be treated if we do not distribute enhancements identically. In a certain sense, these considerations are two sides of the same coin, but distributive justice arguments and the morality of inclusion arguments often point to different solutions. Distributive justice arguments take the structure of society for granted, and ask us to distribute genetic wealth in order to allow everyone equal access to social goods. Morality of inclusion arguments, which typically come from the disability rights movement, take for granted the distribution of genetic wealth and ask us to change society to allow everyone equal access to social goods. In either case, there is an underlying assumption that if we cannot deal with these justice issues effectively, we should not engage in genetic enhancement at all. These arguments often are dramatized by extreme science fiction scenarios in which a genetically enhanced overclass oppresses an unenhanced, or even deliberately cognitively disabled, underclass. Here I use a different scenario, taken from Buchanan and colleagues (2000, p. 196). Suppose a genetic intervention is able to enhance dramatically the immune system of those who have access to it, so that they are sick less often and less severely. A minority who do not have access to this intervention might be shut out of the labor market because of decreased available sick days or employer discrimination. Excluded from a crucial aspect of society, the unenhanced are considered less than persons.

The deliberations of Buchanan and his colleagues are complex, but one can draw a simple lesson from them: the important justice considerations in human genetic engineering do not come from the treatment/enhancement distinction; they come from the principles of distributive justice and the morality of inclusion themselves. Distributive justice typically requires some kind of equality of opportunity. Applied to human genetic engineering, this means that everyone be provided a “decent genetic minimum” (Buchanan et al. 2000, p. 81), although by no means does this require that we all have the same genotype. Furthermore, all the accounts of distributive justice allow individuals to pursue enhancements and even require public funding for some of them. The immune system enhancement I mentioned earlier should be actively promoted by the government, just as vaccines are now. Buchanan and colleagues also suggest that justice

would require public funding for a cognitive enhancement that works best on normal but poorly performing students. The only times enhancements are impermissible are when they are self-defeating, pose threats to public goods, or are unfair. There is no point in engaging in an arms race over height, for instance.

The morality of inclusion also does not outlaw enhancement. It asks us sometimes to change social structures to allow greater access for the unenhanced or differently enhanced, rather than providing universal enhancement. This obviously sometimes will be necessary because not everyone will agree on what constitutes an enhancement or consent to genetic modification of their offspring. On the other hand, Buchanan and colleagues point out that altering society cannot always be the solution for unequal access because sometimes there are gains to be had from social structures that are difficult to access. Their example is choosing a card game to be played by people ranging in age from 5 to 50. Go Fish would be more inclusive, but contract bridge would be more enjoyable for the adults (Buchanan et al. 2000, p. 288).

To deal with human germ-line enhancement, then, will require a combination of public funding for free distribution of enhancements and tailoring of social structures so they continue to include the unenhanced. None of this precludes enhancement altogether. Thus, the justice arguments yield the same results for both human and nonhuman germ-line enhancement: manage the technology to conform with the principles of justice, but do not ban it.

TRUST ARGUMENTS

Philosophers are not used to having to evaluate the trustworthiness of their partners in various debates. Nevertheless, the debate about germ-line enhancement takes place in the real world. A loose regulatory environment requires a climate of trust, and we can evaluate whether such a climate exists for germ-line enhancement. Again, the need for a tight regulatory environment is equally present in the human and the nonhuman case.

One of the largest producers of genetically modified nonhuman organisms is Monsanto, Inc. Before Monsanto was a “life sciences” company, it was a chemical company, with an astonishingly poor environmental record. From 1935 to 1977, Monsanto was the only company in the U.S. to manufacture polychlorinated biphenyls (PCBs), which are now illegal because of their environmental hazards. From 1941 to 1971, Monsanto operated a plant that produced PCBs in Anniston, Alabama. Discharge

from the plant and toxic dumps in largely African-American West Anniston have thoroughly poisoned the soil and water. Company tests found levels of PCBs in fish caught near Anniston to be 7,500 times the legal limit (Grunwald 2002). Internal company documents reveal that Monsanto knew about the danger of their emissions and covered it up (Grunwald 2002; Environmental Working Group 2002). In 1966, the company hired a scientist to test the water in a creek near the town. The researcher released 25 fish into the water. The fish “lost equilibrium and turned on their sides in 10 seconds and all were dead in three and a half minutes” (Sack 2002). When Monsanto became a genetics company, management spun off the Anniston plant to a company called Solutia, which has since become a lawsuit magnet.

The trust argument asks whether companies like Monsanto will act in the public interest if they are restrained only by market forces and their own conscience. U.S. regulatory policy, which still relies heavily on self-reporting, seems to assume that a climate of trust is justified. Given the track record of the players involved, I cannot see how that is true.

Trust issues in human germ-line enhancement come from the shadow of eugenics. The history of eugenics is well known: Before World War II it was common for people of all political stripes to believe that the human gene pool should be improved by encouraging breeding among desirable people and discouraging it among undesirables. After WWII, with the publication of the Nazi crimes, it ceased to be acceptable to advocate eugenics.

To see whether the eugenics movement taints contemporary genetic technology, one first needs a complete accounting of everything that was wrong with eugenics. Surprisingly, there is not much agreement on this. The answer cannot be that eugenics was interested in enhancement, because the vast majority of the abuses, including all of the crimes against humanity, were committed in the name of *negative* eugenics (Buchanan et al. 2000). The problem is that eugenics was immoral in so many ways, that it is impossible to identify a single failing as the crime of eugenics. It is easy enough to pick out a factor like racism, the belief that the good of populations outweighs the good of individuals, or even just a poor understanding of heredity. But clearly these are not the only factors. James Watson, Nobel laureate and codiscoverer of the structure of DNA, argues that the real problem was the use of coercive measures by the state—sterilization, murder, and the like—and that the solution is to keep state regulation as far from genetic policy as possible (in Stock and Campbell

2000). However, the state is not the only source of coercion, and not all harms can be labeled forms of coercion. Indeed the most likely restrictions of freedom to come from contemporary genetic science will be the effect of market forces. Buchanan and colleagues, following Daniel Kevles (1985), suggest that the problem with eugenics was the failure to respect justice.

All of the above accounts contain a measure of truth. Once again, the solution is regulation. Society will need to control the market for genetic technology so that coercion is avoided and justice is respected. However, it also is important that the people currently promoting human genetic engineering are not like the people involved in eugenics. The comments of many involved in genetic science are not reassuring. Watson told a panel of geneticists at UCLA:

I'm afraid of asking people what they think [of germ-line therapy]. Don't ask Congress to approve it. Just ask them for money to help their constituents. That's what they want—money to help their constituents. They don't want to deal with diabetes. They don't want Parkinson's. Frankly, they would care much more about having their relatives not sick than they do about ethics and principles. (Stock and Campbell 2000, p. 84)

Watson is candid here, as usual: He wants the government to give him a pile of money and go away. This would be a bad idea.

NATURALNESS ARGUMENTS

Naturalness arguments include any argument that assigns special moral status to an entity because it is natural. Here I am thinking of arguments that assign value to species or ecosystems apart from the organisms that make them up, the species boundary, or the capacities of the human organism as it evolved in the Pleistocene. I also include any argument that depends on the notion of “playing God.” Again I argue by example, looking at two writers who use naturalness arguments, Vandana Shiva (2000) and Leon Kass (2002). Although the former is regarded as an archliberal and the latter as an archconservative, they have much in common.

Both Shiva and Kass fear the ascendancy of a worldview that they label “reductionism.” Many ideas get hidden under this rubric. Here I distinguish three—genetic determinism, genetic reductionism, and commodification—leaving the unmodified word “reductionism” as the umbrella term. Genetic determinism is a causal thesis. It can range from the false claim that genes act independently of the environment to create traits to the possibly

true claim that genes deserve a place of prominence in the explanation of most traits. Shiva spends a fair amount of time denouncing this sort of determinism, which she sees as the basis for the claims of power made by agricultural biotechnology companies. Kass is less concerned with the causal thesis. In fact, Kass is afraid that a more sophisticated version might be true, eliminating any practical barriers to the commodification of humankind.

Genetic reductionism, by contrast, is a class of moral theses. It covers any claim that equates the purpose or identity of an organism with its genes. Both Kass and Shiva are extremely concerned about this thesis, as witnessed by their attacks on the rhetoric of Richard Dawkins (1989). The real terror of reductionism, however, is the commodification of life. Both Kass and Shiva worry extensively that life is now going to be thought of as a “resource” or “raw material” for the engines of production and consumption. There are some interesting differences, though. Kass is concerned only with the application of reductionism to one kind of animal, humans. Indeed, when he speaks of reductionism, he often means the reduction of humans to the status of other animals, rather than the reduction of life to the status of machines. Shiva, by contrast, worries about the commodification of nonhuman life, but her language shows that she is interested in nonhuman life in an odd way. She speaks of viewing “species” as mere commodities, and of failing to recognize their “intrinsic worth.” The implication is that species are valuable apart from the individuals that make them up.

Rather than attempt to spin the worries into an argument and then refute it, I argue that reductionism itself is not something to worry about. In order for the reductionism in question to be fearsome, one must make an assumption about the value of nature as it is given, either human nature or the environment. The core worry for both Shiva and Kass is commodification, but what exactly is being commodified? Shiva’s worry is not about the possible suffering of individual animals. She includes the value of microorganisms in the value of species, and microorganisms cannot suffer. Shiva’s worry is that the integrity of the species will be violated because their boundaries are no longer set by nature, but subject to human control. But this is only a problem if one assumes that the species boundary was sacrosanct to begin with, and there is no reason to think this. Species boundaries are the product of blind evolution; they were not drawn up with any purpose in mind. If we can alter species boundaries for the better, so be it.

Something similar is going on in Kass's notion of commodification. Kass's core worry is not about any of the elements of human well being. His concern is not about how human beings will be altered; it is rather the fact that human beings will be altered at all. Such alterations are an affront to our dignity. But again, one only can believe this if one perceives something special about human nature as it is given. And again, there is no reason to think this is so. Human nature was determined by what survived long enough to reproduce in Africa 150,000 years ago. There is no reason to think that this is the best, or even a particularly good, way to be. Here, I agree with Watson: "Evolution can be damn cruel" (Stock and Campbell 2000, p. 85).

So Shiva and Kass share something important: They both think there is something intrinsically ethically important about species as they have evolved. Shiva and Kass phrase their worries in terms of commodification, which makes their argument appealing. But not all control is commodification. Buchanan and colleagues (2000) write about the "colonization of the natural by the just." Previously genes were not under human control, and hence not a part of justice. Control of genes could mean rule by goodness.

CONCLUSION

Of the four classes of argument regarding germ-line enhancement examined here, the first three have moderately successful instances, which call for equal amounts of caution and regulation in the pursuit of both human and nonhuman genetic engineering. It is the final class of arguments, the naturalness arguments, that seems to account for the difference in attitude toward human and nonhuman genetic engineering. If successful, such arguments could justify a total ban on germ-line genetic enhancement and would apply more strongly to humans than nonhumans. Naturalness arguments fail, however. Consequently, the discrepancy in attitude toward human and nonhuman germ-line enhancement is unjustified.

NOTE

1. Of course, the genetic modification would not be necessary if people simply stopped eating meat, but as long as people do eat meat, the modification probably would be a good thing.

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Three Problems for the Aesthetic Foundations of Environmental Ethics¹

J. ROBERT LOFTIS

Department of Philosophy
Auburn University
6080 Haley Center
Auburn AL, 36849
loftijr@auburn.edu

Abstract: *This essay takes a critical look at aesthetics as the basis for nature preservation, presenting three reasons why we should not rely on aesthetic foundations to justify the environmentalist program. First, a comparison to other kinds of aesthetic value shows that the aesthetic value of nature can provide weak reasons for action at best. Second, not everything environmentalists want to protect has positive aesthetic qualities. Attempts have been made to get around this problem by developing a reformist attitude towards natural aesthetics. I argue that these approaches fail. Third, development can be as aesthetically positive as nature. If it is simply beauty we are looking for, why can't the beauty of a well-constructed dam or a magnificent skyscraper suffice?*

Aesthetic considerations clearly have played a major role in the rhetoric of environmentalism, from 19th century landscape painting to contemporary Sierra Club calendars. Aesthetic considerations have also played a big role in the psychological motivations of environmentalists, both famous and rank and file. Aldo Leopold's *A Sand County Almanac* tells us a great deal

about the role of aesthetics in environmental rhetoric and psychology. It does this first of all by being an influential environmentalist book that owes its influence to its beauty and its ability to convey the beauty of nature both majestic and ordinary. More importantly, Leopold is often explicit about the fact that aesthetics is a big part of his motive for adopting his environmental ethic, and he claims that it is crucial for other people and the environmental ethic they adopt. In "Conservation Esthetic," for instance, he describes the codes of sportsmanship promulgated by hunters and notes, "It is clear, though, that these economic and ethical manifestations are results, not causes of the motive force. We seek contacts with nature because we derive pleasure from them" (Leopold 1949, 167-168).

Given the prominence of aesthetic considerations in environmental rhetoric and psychology, it is natural to ask what actual justificatory power such considerations have. This line of investigation is further motivated by the fact that many philosophers have suggested that the value of nature is primarily aesthetic (e.g. Sober 1986). The most important example of this view is Eugene Hargrove's

Foundations of Environmental Ethics (1989). In this book Hargrove argues that aesthetic considerations justify an environmental ethic and the existence of the environmentalist movement, where the former is the ethical imperative to preserve natural species, habitats, and objects, and the latter is the political movement, active since the 19th century, to promote an environmental ethic. A couple of features obscure the fact that Hargrove's aim is essentially justificatory. The first is that Hargrove's thesis is in part a claim about the historical roots of the environmental movement. Thus he writes, "The ultimate historical foundations of nature preservation are aesthetic in a broad context that encompasses the value perspectives of nineteenth-century naturalists, painters, and poets" (*ibid*, 168). Hargrove tells a detailed story about the origins of contemporary environmental attitudes in the interaction between 19th century romantic poets, landscape painters, and artistically minded natural historians. Hargrove's strictly historical story, however, leads him to a philosophical argument, the "ontological argument for the preservation of nature" (*ibid*, 191). The ontological argument follows G.E. Moore in asserting that the actual existence of objects with positive aesthetic qualities is valuable apart from those objects being experienced. It is then argued that we have a duty to preserve the existence of positive aesthetic qualities in nature that is akin to our duty to preserve works of art with positive aesthetic qualities. This argument is intended to be more than a historical reconstruction of our actual motivations for preserving nature. It is a philosophical argument designed to justify such motivations. The argument's philosophical nature can be seen in the fact that it is defended against various objections, such as the claim that it is impossible to carry out in practice (*Ibid*, 199).

The other factor that clouds the justificatory nature of Hargrove's enterprise is his pragmatic, pluralist attitude toward ethical foundations. He admits that a day may come when better foundations for environmental ethics are discovered (*Ibid*, 10–11). He also asserts that ethical foundations do not form a coherent system of rules that can be rigorously applied in ethical decision making, but rather consist of isolated rules used to sharpen our sensibilities in ethical education (1985; 1989, 6). However, even if other justifications for environmental ethics may exist in the future, Hargrove offers no indication that satisfactory nonaesthetic justifications exist now. Furthermore, whether our rules are applied directly as a coherent system of decision making or are used to sharpen our ethical sensibilities in moral education, they ought to be justified, in the sense that they are supported by good reasons. In the end, Hargrove's position is straightforward: aesthetic arguments for

environmentalism are not just rhetorician's tricks or quirks of the psychology of environmentalists. They are the best reasons we have right now for embracing an environmental ethic.

In this essay, I will argue that aesthetic considerations do not have this kind of justificatory force. My primary target will be Hargrove, because his is the most developed aesthetic foundation for environmental ethics. However, most of my arguments will apply to anyone who advances a program like Hargrove's. In what follows I will take my definitions of key concepts from Hargrove. By an environmental ethic I mean a *preservationist* ethic, not merely a conservationist one. The goal of environmentalism is to leave much of nature in its original state or to restore it to that state. I will also follow Hargrove in assuming that environmentalism is a (somewhat) unified movement, which began with folks like John Muir and continues today with issues like the struggle over the Arctic National Wildlife Refuge. I will not attempt to define an environmental ethic more concretely than this, but will instead rely on examples of things environmentalists have demanded or done, assuming that these are representative of what an environmental ethic demands. I will use the terms 'foundation' and 'justification' more or less interchangeably. I assume that the job of a foundation of environmental ethics is to provide a good justification—one that uses the kind of arguments that are likely to lead to truth—for the kinds of demands that environmentalists have made over the years.

I will argue that aesthetics are not sufficient to ground an ethic of the preservation of nature. My assumption will be that this shows we should find other justifications for environmentalism. These justifications could either be a supplement or a replacement for aesthetic foundations; however, if I am right, aesthetic considerations could only play a limited role in the foundations of environmental ethics. The other arguments will do most of the heavy lifting. One can, of course, draw a very different conclusion from the arguments of this paper. If aesthetic considerations play a big role in the rhetoric of environmentalism and psychology of environmentalists, but have no real justificatory force, then the environmentalist program should be abandoned. Nothing I say will rule this out. Those who take this option may also want to challenge the assumption that there is one environmentalist program. Perhaps the failure of aesthetic foundations will not lead to the demise of environmentalism, but a change in environmentalism.

In what follows I will suggest three problems for the aesthetic foundations of environmental ethics, which I will label the superficiality problem, the range of habitat problem, and the technology-is-beautiful

problem.

The Superficiality Problem

The problem of superficiality asserts that aesthetic considerations involving nature are weak and cannot motivate the kind of substantial measures environmentalists routinely recommend.² Environmentalists routinely ask people to sacrifice their jobs and economic well-being for the environment. Environmental concerns motivate intrusive regulations of many industries. If aesthetic considerations were the only thing at stake, all this would be unjustified. The way to gauge the strength of aesthetic considerations regarding nature is by analogy to the strength of other kinds of aesthetic considerations. Whether you think that there is one thing called "aesthetic value" or that aesthetic values form a family of related properties, we should expect them all to lead to similar levels of ethical duties, *ceteris paribus*.

The standard way to motivate duties to preserve positive aesthetic qualities in nature is by analogy to our duty to preserve positive aesthetic qualities in art. The duties generated by positive aesthetic qualities in nature can be seen in a different light if we compare them to another kind of aesthetic consideration: the duty to protect and preserve positive aesthetic characteristics in humans. We respond to the positive aesthetic characteristics of other humans, particularly physical beauty, at least as strongly as we respond to the positive aesthetic characteristics of nature. Even if a face never really launched a thousand ships, comely faces are often implicated as the cause of many fistfights. Moreover, there is good reason to think that our judgments of positive aesthetic characteristics of humans, like our judgments of positive aesthetic characteristics in landscapes, are likely to have an evolutionary basis. Advocates of prospect-refuge theory (Appleton 1975) argue that our instincts about beautiful landscapes are shaped in part by the sort of landscapes that afforded our hominid ancestors both good shelter and a view of approaching predators and prey. Advocates of evolutionary psychology present evidence that some of our sense of what makes a face attractive is based on features that indicated good health in the potential mates of our hominid ancestors. On the other hand, there is no plausible case to be made that our sense of positive aesthetic qualities in art is so hardwired, except when it draws on either positive aesthetic qualities in humans or in nature.

Nevertheless, the duties generated by human positive aesthetic qualities are weak at best. To keep the analogy straight, I will not look at the things we do

to maintain our own beauty, which are associated with disreputable traits like vanity, and focus on duties that might be generated by the beauty of others. This will give us a better analogue to the duties to protect and preserve natural places and objects that we do not own.³

The contrast between positive aesthetic qualities in humans and in nature comes when we consider the behavior that they are thought to license. In Western society we do act to preserve positive aesthetic qualities in humans, in that we shower many rewards on people—models, movie stars—who are beautiful or who make themselves beautiful. But our attitude here is exactly reversed from our attitude toward beauty in nature. We quite willingly spend money in adoration of the Tom Cruises of the world, but (hopefully) feel a little ashamed of it, thinking it a little silly and a waste of resources. On the other hand, people have to be compelled to preserve the beauty of nature, and when they do so we call it a virtue. So if we model the duties generated by positive aesthetic qualities in nature off of duties generated by positive aesthetic qualities in humans, we will have to change what we do. Seen in this light, environmental organizations are like clubs devoted to promoting the careers of models other people find unattractive. A worthwhile goal, I suppose, but not the sort of thing that would justify intrusive government regulation of the fashion industry. In general, we do not let human physical beauty play a role in important decision making. If a doctor had to choose between giving one of two patients a heart, she could not justify her decision by saying that one of the patients was more beautiful than the other (or more sublime, or more in possession of any other positive aesthetic characteristic). A doctor certainly couldn't let aesthetic characteristics outweigh nonaesthetic characteristics, like the likelihood of survival past five years. But if a doctor cannot make a decision regarding who gets a heart based on aesthetics, how can environmentalists ask thousands of loggers to give up their jobs and way of life on the basis of aesthetics?

If the positive aesthetic qualities of nature are analogous to the positive aesthetic qualities of humans, and environmentalists are motivated by aesthetic concerns, then most environmentalists would be superficial, and some would be genuinely psychotic. Consider the activist Julia Butterfly Hill, who spent two years in a redwood to keep it from being cut down and to protest the clearing of the surrounding forest.⁴ She put her life in serious jeopardy, exposing herself to cold, storms, and lightning strikes, not to mention harassment from employees of Pacific Lumber. If one were to try to come up with someone who went to similar lengths over human physical beauty, one would

have to think of a kind of stalker. Consider a man who sees a woman on the subway, becomes fixated on her, and spends two years outside her apartment window. Suppose further that he believes he is doing this for the benefit of the person he is stalking: perhaps he is saving her from imagined dangers, or perhaps he simply thinks she would be happier if she were with him. Now we would certainly condemn such a person because he invaded his victim's privacy. We also condemn him for not consulting with the person he is trying to protect, but simply forcing his actions on her. These are certainly the stalker's biggest crimes. But there is something else askew about him, besides these violations of someone's rights. His priorities are just weird. You should devote your energies to people you know more deeply than by sight. But if in the case of human physical beauty, we consider someone spending two years outside an apartment window to be psychotic, then, if we regard Hill's motivations as purely aesthetic, we would regard her too as psychotic. Therefore, if we want to view Hill's actions as noble, she must be motivated by more than mere aesthetics. (This is in fact the case. Hill uses a variety of arguments to justify her protest, both anthropocentric and nonanthropocentric.)

There are several objections that might be made at this point. First, one might protest that the proper analogy for Hill's protest would not be to someone who spends two years stalking a woman he sees on the subway, but to someone who enters into a two-year relationship with someone he met on the subway. Certainly this better captures the relationship Hill developed with Luna, the tree she sat in. (When asked if she had a boyfriend, she replied, "Who needs a boyfriend? I have a tree" [Hill 2000, 231].) But this change only reinforces my point. Here I am trying to separate aesthetic reasons for valuing nature from other reasons for valuing it. Aesthetics, as Allen Carlson points out, "is the area of philosophy that concerns our appreciation of things as they affect our senses" (2000, xvii). A relationship is deeper than mere aesthetic appreciation. If we want to find the analogue to the purely aesthetic appreciation of nature, we would have to look to the purely aesthetic appreciation of humans, and this will be something like the acquaintance one has with someone when one knows them purely by sensory qualities. While a romantic relationship may be a more accurate model of the actual relationship Hill had with Luna, a stalker is a more accurate model of Hill had she been motivated by purely aesthetic concerns. The fact that actual activists have deeper motivations than stalkers only shows the inadequacy of the aesthetic model.

A deeper objection might claim that we only object to overvaluing the aesthetic qualities of humans

because it obscures the deeper value that humans have (their Kantian worth as rational agents, the achievements they worked hard for and value about themselves, etc.). When we accuse someone obsessed with the beauty of humans of being superficial, we do so because she is failing to recognize these more important values. While I grant that human physical beauty can obscure other sorts of worth, I think there are more problems with overvaluing it than this. The problem with Tom Cruise being overpaid is not that we are failing to appreciate the real Tom Cruise. The problem is that no one should be paid millions of dollars for looking good, when hundreds of millions go malnourished every year worldwide.

One might object, third, that overemphasis on the physical beauty of humans is only superficial if you only value certain humans.⁵ We regard someone who places an inordinately high value on small-waisted and large-breasted humans as superficial, but someone who highly values the appearance of all humans equally might be deeper. This is important because often those who endorse the aesthetic foundations of environmental ethics also tend to endorse so-called positive aesthetics, which assert that all natural objects are beautiful because they are natural. Hargrove endorses a weak form of this thesis.⁶ But if the correct analogue of the aesthetic attitude toward nature is the belief that all humans are equally beautiful, then one cannot accuse the person who tries to motivate the preservation of nature on aesthetic grounds of being superficial.

The problem with this objection is that simply viewing all humans as equally beautiful is not enough to avoid the charge of superficiality. One might be seen as more open minded, but one is still focused on properties that we consider less important. Certainly we feel as though those who merely appreciate someone for their physical appearance have a superficial appreciation of that person, even if they have a similar appreciation for everyone else. Indeed, it could be that those who are most enamored of appearances do find a wider range of humans attractive. Plato's description of the lover of boys is often quoted because it rings true: "Or isn't that the way you people behave to fine and beautiful boys? You praise a snub-nosed one as cute, a hook-nosed one you say is regal, one in between is well proportioned, dark ones look manly, and pale ones are children of the gods" (*Republic* 474e).⁷ But despite the amorous person's ability to excuse any body type, we still find him essentially superficial.

If we compare positive aesthetic qualities in nature to positive aesthetic qualities in humans, the duties generated do not seem so strong. But what about the more typical comparison, duties to positive

aesthetic qualities in art? This is certainly the comparison that Hargrove relies on. To make this defense work, however, one must argue that of all the kinds of aesthetic objections in the world, art objects are the best analogy for aspects of nature with positive aesthetic qualities, and no such argument has been given. Further, it is not even clear that should such an argument be given, the analogy to duties to art objects would demonstrate strong duties to nature. It is true that the positive aesthetic qualities of art do demand sacrifices, but do they really demand the level of sacrifice that environmentalists ask us to give for the environment? Environmentalists are currently asking oil companies to forgo drilling in the "1002" area of the Arctic National Wildlife Refuge (ANWR) for the sake of preserving a pristine ecosystem. This is a potential loss of between 4.3 and 11.8 billion barrels of oil and the accompanying profits (USGS 1998).⁸ Prodrilling partisans, using an estimate of 10 billion barrels of technically recoverable oil and a price of \$22 a barrel, have estimated that drilling would bring a peak of \$800 million dollars a year to the state of Alaska (The McDowell Group 2002).⁹ By contrast, the total budget for the National Endowment for the Arts in the year 2002 was \$115 million (Weinberg 2002). Admittedly, any dollar analysis is crude, and the numbers I have provided were merely those that were closest to hand, but I think they provide a flavor of the scale of the ethical imperatives that are being placed on people.

Advocates of aesthetic foundations typically rely on some account of the metaphysics of aesthetic properties to account for the duties generated by them. They might, inspired perhaps by Plato, insist that The Beautiful is close to The Good or identical with The Good, that once we understand what beauty really is, our drive toward beautiful things will be channeled into a drive to what is truly good; that the positive aesthetic qualities we are discussing here are not things like mere beauty, but things like sublimity, which must entail real duty. Such accounts of the duties generated by aesthetic properties face a dilemma, however. Accounts that manage to show that aesthetic properties generate strong duties must ask us to radically reform our ordinary notions of aesthetic properties. Plato is a prime example of this: his form of beauty winds up being quite far from anything his audience would have recognized as beautiful, had they not followed Plato down his dialectical path. This kind of radically reforming program in aesthetics is not helpful to environmental ethics, though, because it essentially creates more obstacles for the public acceptance of the environmentalist program, rather than providing a strong justification. Without the reforming metaphysics, however, the duties generated by

aesthetic properties remain superficial. Thus a dilemma for the aesthetic foundations of environmental ethics: either adopt a difficult to swallow account of the metaphysics of aesthetics and have strong duties, or adopt a more standard metaphysic and have weak duties.

Hargrove's account of the roots of aesthetics attempts to follow the first path and offer a reforming account of the metaphysics of natural positive aesthetic qualities. He also runs into the same problem that others on that horn of the dilemma do: he must convince us of his unusual metaphysic. Hargrove argues that natural objects have positive aesthetic qualities because they are the product of a creativity that does not proceed according to a plan or a creative imagination. The processes that created natural objects proceeded blindly.¹⁰ As a result "their existence precedes their essence" (1989, 184). This is what puts the "ontological" in the ontological argument. This also means that the positive aesthetic qualities of natural objects are bound up in their existence in a way that is not true for artificial objects. In sections entitled "The Superiority of Natural Beauty" and "The Ontological Argument for the Preservation of Nature," Hargrove argues that this tie leads to stronger duties to positive aesthetic qualities in nature than in artificial objects. With artificial objects there is a plan that preexists the object, and that plan can be the bearer of aesthetic qualities, to the extent that it can even substitute for the existence of the actual object. "Sketches for a work of art that was never finished can serve as an adequate source for the beauty that would have been in the original. Such is not the case, however, with natural beauty" (ibid, 193). With natural objects, aesthetic properties must be discovered by investigating the actual object. Thus it is more important that we hang on to the actual object than it is with artificial objects.

As an account of the nature of positive aesthetic qualities in nature, this is not very appealing, largely because it fails to draw a real contrast with positive aesthetic qualities in art. First of all, not all art is produced according to a plan. Beat poetry, the free jazz of Ornette Coleman, and John Cage's aleatoric pieces (pieces that incorporate chance processes) all attempt to minimize the amount of planning that goes into the work. Moreover, these art forms are not always attempts to undermine existing conceptions of art, but grow out of existing traditions.¹¹ Coleman's free jazz was a natural extension of existing rules of jazz improvisation. Up to that point, jazz had been improvised within a regimented harmonic structure, which presented worthy challenges to knowledgeable and agile players like Monk and Coltrane. By eliminating the harmonic regimentation, Coleman gave

license to the expressive, pure improvisatory aspect of jazz. It was a bold move, certainly, but not an attempt to undermine Western norms of art.¹² Similar remarks can be made about the beat poets: by his own admission, Allen Ginsberg's early work looks in retrospect more like an extension of Walt Whitman's project than something bold and new.

Second, it is not at all clear to me that preliminary sketches are even remotely a substitute for the actual work. Hargrove's example here is a work of Christo, *Valley Curtain*. Hargrove notes that most people only know the work through architectural plans for it shown at a gallery. Hargrove claims that the appreciation of these plans does not depend on the knowledge that they were actually carried through. Perhaps this is an irreconcilable clash of intuitions, but my appreciation of Christo's work is completely dependent on the knowledge that these gigantic projects were actually carried through, and I'm certain that seeing the plans is no substitute for seeing the actual projects. He actually wraps up these enormous buildings! That's impressive. If my intuitions are anywhere close to the main, then Hargrove's argument fails. Existence is just as important for artificial objects as it is for natural objects.

One might object, finally, that in all these arguments I am focusing on extreme members of the environmental community, thus making the strength required of aesthetic considerations too strong. One might think, for instance, that Hill is in fact as crazy as a subway stalker and that aesthetic foundations are perfectly adequate for the sane members of the environmental movement. One could add that Hill's tree sit was in part supported by Earth First!, whose extreme version of nonanthropocentrism is not something the foundations of environmental ethics needs to justify. In reply I would note that Hill distances herself from Earth First! (2000, 85) and second, that the example of ANWR shows that throughout the environmental community individuals are being asked to sacrifice their interests to a degree that would be ludicrous if the goal were simply aesthetic value.

The Range of Habitat Problem

The range of habitat problem runs like this: if we are to preserve nature because it has positive aesthetic qualities, then it seems as though we should only preserve a limited range of landscapes—those that we find positive aesthetic qualities in. Thus we have a strong duty to protect the Grand Canyon, but a weaker duty to protect less attractive areas. However, the typical environmentalist does want to protect the less attractive areas. The issue is pressing: it is frequently noted in the debate over developing the Arctic National

Wildlife Refuge that the refuge is not a particularly inviting place.¹³ Similar issues come up with the preservation of species. *Prima facie*, it seems as though the believer in the aesthetic foundations of environmental ethics can only support the preservation of charismatic megafauna. Elephants and Bengal tigers are safe, but the snail darter can go. Thus it appears that the aesthetic foundations of environmental ethics will not justify the protection of the full range of entities environmentalists are currently fighting to protect.

There are three basic lines of reply, none of which work in the end. The first two both work by expanding our notion of what has positive aesthetic qualities. The first, more moderate reply is to establish some standard of objectivity in aesthetic judgments of nature and then argue that the seemingly unattractive species and landscapes are actually full of positive aesthetic value. Almost every major environmental figure since the 19th century has spent some time arguing that some ordinarily disdained aspect of nature is actually beautiful. Prominent examples include Muir (1894, ch. 4) and Leopold (1949, pt. 1 ch. 4). Lopez's *Arctic Dreams* (1986) is, in part, an attempt to do this for the barren arctic landscape one finds in the 1002 region of ANWR. A more rigorous extension of this tradition would begin by establishing a standard of taste. One could say, for instance, with Allen Carlson (2000) that proper aesthetic appreciation of nature requires a scientific background. Appreciating a landscape involves understanding its ecology and geology. Appreciating an animal involves understanding its biology. Once one establishes an objective standard of taste, one can then argue that traditionally underappreciated landscapes and species are actually full of positive aesthetic qualities and deserve protection.

The problem with this approach is that there is no guarantee that a scientifically informed aesthetic will lead us to preserve the range of habitats and species environmentalists want to preserve. A lot depends here on the way in which scientific knowledge is supposed to affect our aesthetic judgments. One might say that scientific knowledge is important because it reveals harmony and balance. Carlson thinks this is what Holmes Rolston (1975, 101) has in mind when he talks about how ecological science can reveal values in nature. But if we do this, we will be stuck whenever we find our scientific work revealing discord and disequilibrium. This is a very real possibility. Indeed, the trend in ecology right now is to emphasize the instability of natural processes.¹⁴ Suppose science revealed that ANWR is a chaotic, unbalanced place. Suppose, as is perfectly likely, that the size of the Porcupine River caribou herd (which breeds in the 1002 region) varies dramatically, even when

undisturbed. Would we then say that ANWR really lacks positive aesthetic qualities and therefore is not worth saving? It doesn't seem that we should make our judgments about what to preserve hostage to such contingencies.

One might say, with Carlson, that the purpose of scientific knowledge is to provide the kind of background that knowledge of art history provides for the judgment of art. For Carlson, this is a matter of finding the right categories under which to judge something. Carlson compares judging the beauty of van Gogh's *The Starry Night* with judging the beauty of a rorqual whale. To judge the beauty of *The Starry Night* one must know that it is postimpressionist. As a postimpressionist painting it is "vibrant and dynamic" (2000, 88). If, on the other hand, one thought of it as a German expressionist painting, it would appear "more serene, somewhat subdued, even a bit dull" (ibid). Similarly, to judge the beauty of the rorqual whale, one must know that it is a mammal. As a mammal, it is "graceful and majestic." If one were to mistake it for a fish, it would appear "lumbering, somewhat oafish, perhaps even a bit clumsy" (ibid, 89). (One might add that if one regarded the whale as a bird, it would appear bizarre and freakish.) The idea that natural objects should be viewed in light of some equivalent of genres does wonders for the appreciation of places like ANWR. Criticizing ANWR for being desolate now looks like criticizing the movie *Pulp Fiction* for being violent. Of course *Pulp Fiction* is violent, it's a trashy exploitation flick. Similarly, one should not be surprised to find ANWR barren. Having a very low biomass is just part of what it is to be an arctic ecosystem.

Unfortunately the remark about *Pulp Fiction* clues us into a possible problem with this approach. Defending *Pulp Fiction* by saying that all members of its genre are violent doesn't get one very far against a critic who dislikes the whole genre. Certainly we have a tradition of critics going back to Plato who would simply do away with whole genres of art. Similarly, someone who felt ANWR was ugly and not worth protecting could simply say that the whole category of arctic ecosystem is not worth protecting. We still do not have a reason to protect the whole range of ecosystems environmentalists want to protect.

The second way to expand our notion of which habitats and species have positive aesthetic qualities is to simply declare that all natural things, to the extent that they are natural, only have positive aesthetic qualities. This means adopting the so-called positive aesthetic mentioned earlier. This stance is radical, but it has had numerous adherents historically. Both John Muir and William Morris have made comments indicating that they felt all landscapes are

beautiful.¹⁵ Hargrove endorses a weak form of this thesis.¹⁶ This approach makes all landscapes worthy of defense, eliminating the range of habitat problem. But positive aesthetics has a famous defect: it seems to make *being natural* the property that eliminates all negative aesthetic qualities. However, there are all kinds of things that are natural that have profoundly negative aesthetic qualities: tapeworms, smallpox, an animal eating its young. One might, if one had a particularly dark turn of mind, learn to find such things aesthetically positive, but clearly the burden is on the positive aesthetician to show how this is possible or even desirable.

Rather than attempting to expand our notion of what species and habitats have positive aesthetic qualities, we might attribute instrumental value to the species and habitats we do not find positive aesthetic value in. Wetlands may be dismal, swampy places, but they filter our water, fight erosion, and provide a vital habitat for species we do find beautiful (Owen et al. 1998, 245). By taking this stance, one is not abandoning the aesthetic foundations of environmental ethics. We still believe that the ultimate value of nature comes from its positive aesthetic qualities. We are simply arguing for the preservation of the parts of it that lack positive aesthetic qualities on the grounds that they are necessary for the parts that do have positive aesthetic qualities.

This third attempt to defend against the range of habitat problem is quite effective, as far as it goes. Certainly for many habitats and species, this kind of instrumental value will be manifest. But one can't count on it always being present. For many endangered species, as Rolston (1985 62) points out, the very fact that their numbers are so diminished often means that they cannot play a big role in the stability of the ecosystem. Rolston goes so far as to assert "If all seventy-nine plants on the endangered species list disappeared, it is doubtful that the regional ecosystems involved would measurably shift their stability" (ibid). The preservation of habitats faces similar problems. While many habitats contribute to the health of the surrounding areas or even the global environment, some simply do not.

I conclude that the aesthetic foundations of environmental ethics cannot support the preservation of the full range of habitats and species environmentalists wish to preserve. Now this may be a prime place in the argument to say that the problem is not with the aesthetic foundations of environmental ethics, but with the environmental program as it is typically pursued. If environmentalists wish to protect a species that has no positive aesthetic characteristics, and is not necessary for the survival of any other species that does, then environmentalists are

overreaching their foundations. This option might be especially tempting to those who think that we don't need to save every species and every natural habitat. Again, nothing I have said will rule out this move.

The Technology-Is-Beautiful Problem

The technology-is-beautiful problem stems from a simple fact: a well-designed piece of technology can have a wide variety of positive aesthetic qualities. This means that by technologically altering the landscape, one is not necessarily making it more ugly. Development, rather than being the defacement of a beautiful painting, can be more like replacing one painting with another. The idea that technology can be beautiful might seem anathema to many environmental ethicists, but it must be acknowledged that it is at least a possibility. Whole departments on our campuses are devoted to the study and production of good-looking buildings. One can hardly say that they always fail. Millions flock to see tourist attractions like the Hoover Dam and the Empire State Building. Done properly, the technological alteration of a landscape can be breathtaking. Cable television is full of channels like National Geographic and Animal Planet, which capitalize on the appeal of nature, but it is also full of channels which capitalize on the appeal of technology, like TechTV or The Discovery Channel: Wings, which is devoted to airplanes.

There are several possible replies to this objection. The first is to say that although technology can be beautiful, the sort of development of the landscape that angers environmentalists has no positive aesthetic qualities. Strip mines, suburban sprawl, and smog-belching factory complexes are simply eyesores. My reply is to admit that we do find these things ugly, but to ask whose fault this is. Recall that the aesthetically based environmentalist has already asked us to revise our perception of what has positive aesthetic qualities in order to bring seemingly unattractive ecosystems under her protective umbrella. Why isn't the same option open to the advocate of development?

Such a change in our aesthetic tastes has precedent. In the 17th and 18th centuries, aesthetic attitudes were radically different than what they are today, strongly favoring the artificial over the natural. Mountains, for instance, were considered grotesque eruptions from the soil. A typical traveler writing in 1622 called the Alps "high and hideous" (quoted in Reynolds 1909/1966, 8). In part, the ugliness of mountains can be attributed to the danger and hardship in passing them in an era when roads were not well built and maintained (Reynolds 1909/1966, 13). However, there are deeper problems at work here.

Reynolds notes that the two charges most "persistently and definitely brought against mountains are that they are useless, and that they are a deformity on the face of the earth." Reynolds goes on to add, "Now the first of these is but another expression of the dominant utilitarian standards of value, and the second is an outcome of the prevailing desire for orderly and systematic arrangement" (1909/1966, 14). If we could only return to the days when an efficiently used landscape was the aesthetic ideal, then those who want to develop nature would have their game made.

Note further that the situations of the advocate of nature and the advocate of development are exactly parallel. Both can point to obvious cases of great beauty. The advocate of preservation can point to spectacular vistas like the Grand Canyon, and the advocate of development can point to great architectural achievements like the Empire State Building. Both the advocate of preservation and the advocate of development also have to defend the beauty of things that people do not typically find aesthetically positive. It is not at all clear who presents the stronger case.

The second objection says that while natural objects do not necessarily have more aesthetic qualities than artificial objects, the loss of natural objects represents the loss of a particular kind of aesthetic value. The loss of wild places might be akin to someone painting over all of the cubist canvasses, for example. The problem with this objection is that genres of art fall by the wayside all the time and no one considers it a great loss. Few people perform medieval morality plays any more. Genres are not the only things to disappear. Whole media fall by the wayside. In the 19th century, large narrative or landscape paintings were rolled up in cylinders and gradually unrolled before an audience, accompanied by a lecture or music. These panoramas were an ancestor of film, and died away completely when movies were invented. One might object that in the death of morality plays or panoramas, what disappears is a performance tradition. The physical objects themselves—paintings, texts—remain.¹⁷ But this kind of preservation is akin to species surviving only in captivity or landscapes recorded in photographs and paintings. It is not the kind of preservation environmentalists lobby for.

I have identified three problems for the use of aesthetic considerations to found an environmental ethic: the superficiality problem, the range of habitat problem, and the technology-is-beautiful problem. I conclude that aesthetic considerations cannot play a significant role in the foundations of environmental ethics. If we environmentalists are to adequately press our case, we need to find a better way to characterize the value we find in nature.

Notes

1. This paper began as some thoughts I had at an NEH Summer Institute run by James Liszka entitled "Environmental Ethics and Issues: Alaska as a Case Study" at which Eugene Hargrove was a visiting scholar. I am indebted to Hargrove, Liszka, and the participants of the Institute. Versions of this paper have been presented at the 2001 meeting of the Alabama Philosophical Society, October 26–27, and meeting of the Society for Philosophy in the Contemporary World, Santa Fe, NM, July 26, 2002. Thanks go to the audiences. Some material was submitted to another journal and received anonymous referees comments, which were extremely helpful. Molly Hinshaw read almost every draft of this paper and was always helpful.
2. Gary Varner makes a similar point in passing, putting it in terms of the duties one might have to objects and the interests possessed by sentient creatures: "Given the centrality of duties of beneficence and non maleficence to our shared conception of morality, it is difficult to see how these *prima facie* duties [duties arising from aesthetic qualities] could override duties generated by the existence of interests" (1998, 21–22).
3. The need to clarify this point was brought to my attention by an anonymous referee for another journal.
4. For Hill's story, see Hill (2000).
5. I owe this objection to Molly Hinshaw.
6. He says that all natural things are beautiful, but some are still more beautiful than others (1989, 179). This idea seems to be self-contradictory, however. Positive aesthetics assert that a negative aesthetic judgment of nature is never warranted, but if some things are more beautiful than others, then there is a simple negative judgment that is warranted. If X is more beautiful than Y, one can condemn Y by saying it is not as beautiful as X.
7. Grube and Reeve's translation in Cooper, ed. (1997).
8. The numbers represent the amount of oil that is technically recoverable, not economically recoverable.
9. The partisans here are Supporting Alaska Free Enterprise, an activist group founded in March 2002 and funded by mostly by Alaska business people (Bradner 2002).
10. Hargrove maintains that is true even for theists, but at the cost of assuming an answer to the Euthyphro question. Things are good because God loves them. God does not love them because they are good.
11. I owe this point to a question raised by an anonymous reviewer for another journal.
12. Wilson (1999) also argues for seeing Coleman as a natural extension of the existing tradition.
13. A flyer from Arctic Power, a lobbying group created by the Alaska state legislator to promote development in ANWR, states, "This is no Serengeti. The Coastal Plain is a frozen barren for nine months of the year." Another flyer bears a picture of vacant, windswept tundra with the caption, "This is what Alaska is like for most of the year, including the coastal plain of the Arctic National Wildlife Refuge." (Both flyers are available at www.anwr.org.) Mortimer Zuckerman, editor of U.S. News and World Report, writes, "In the first place, the coastal plain isn't the Alaska of the famous postcard vistas... Rather than the calendar art of the last frontier, the land at issue is a flat boggy treeless place where temperatures can drop as low as 40 degrees below zero" (Zuckerman 2001).
14. For an overview of this trend, see Callicott (1996).
15. Morris: "For surely there is no square mile of earth's inhabitable surface that is not beautiful in its own way" (1898, 24). Muir: "None of Nature's landscapes are ugly so long as they are wild." (1901, 6–7).
16. He says that all natural things are beautiful, but some are still more beautiful than others (1989, 179).
17. An anonymous reviewer for another journal raised this point.

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