

Moral Issues Associated with Bioengineered Species: Stewardship, Abuse and Sustainability



Natalie Dandekar
University of Rhode Island

Edward Zlotkowski
Bentley College

Editors' Note: The following paper coauthored by Professors Dandekar and Zlotkowski, response by Professor Westra, and reply by Dandekar and Zlotkowski were presented at the Eastern Division meetings of the Society for the Study of Ethics and Animals, held in New York City, New York, December, 1991.

Biogenetic engineering only very recently enabled human beings to construct lifeforms that would be impossible except for scientific technology. The very newness of these techniques and the obvious ways in which the origin of "engineered" creatures derives from the activities of human agents allows us to think about questions derived from the discourse of environmental ethics in a new way, for they force us to ask what are the obligations humans owe to animals whose very existence derives from human agency but whose lives thereafter might possess intrinsic value to the animal, beyond the instrumental values attributed by the engineering perspective. Thinking about these creatures, how shall we answer the basic questions of

1) whether and to what extent human obligations with regard to animals are owed directly to the animals and

2) what constitutes an appropriate relationship between culturally and technologically empowered human agents and a biologically interdependent world?

Mary Shelley's *Frankenstein*¹ provides an early fictive exploration of ethical dilemmas springing from a realization of the scientific power to create bioengineered species. Through the characteristics given Dr. Frankenstein and his creature, the novel provides a fictive platform for analyzing both what we take to be loci of value sufficient to command human respect and the manner in which such matters are to be decided.

The Novel

Originally conceived as an entertaining horror story, this 19th-century work begins with a young man who seems destined to enjoy the best things in life. Possessed of good health, a loving family, devoted friends and economic security, he is even assured that the woman he loves loves him in return. Embarking on a course of scientific study, he wins the respect and honor of his colleagues and academic superiors.

But Dr. Frankenstein wants more: he wants to create a new form of life. Focussing his attention only on this aim, he works in secret, giving no thought to a



PHILOSOPHY

creator's responsibilities to his creature or to the effect that creature's needs might have on his own species. Eager to break boundaries hallowed by culturally set limits, he dismisses these as "superstition." Yet, when he succeeds, the creature's otherness horrifies and repels him. He rejects this creature of his making and apparently expects it just to die or disappear. Such an expectation may sound naive, but at bottom it accurately reflects the assumptions about scientific mastery that presume scientific power enables the scientifically competent to control undesired consequences of scientific progress as well as the desired ones.

The fallacy of expecting that the power to realize one's desires will coincide with control is fully demonstrated in the novel. Despite being (by human standards) horrifyingly ugly, the creature proves not just viable but uniquely hardy and intelligent. Treated cruelly by every human who sees it, it understandably grows enraged at the species that simply assumes a right to abuse it. It wants a share of happiness for itself, and by this it means companionship from a female of its own kind, one who will not be horrified by its appearance, one who can share its activities. Finally, on Mont Blanc, it manages to trap its maker into facing squarely what he has done. "We are bound by indissoluble ties," the creature insists; "you must do your duty by me."

Moved by the creature's arguments, Dr. Frankenstein assents: "For the first time I felt what the duties of a creator toward his creation were, and that I ought to render him happy"(87). He undertakes to provide the creature with a female of its kind. But then, on reflection, the doctor decides he cannot risk providing reproductive capacities to this "unnatural" being. Instead, he decides he must safeguard the well-being and capacity for happiness of his own species. As he says in summary toward the end of his life,

I created a rational creature and was bound towards him, to assure, as far as was in my power, his happiness and well being. This was my duty; but there was another still paramount to that. My duty towards the beings of my own species had greater claims to my attention because they included a greater proportion of happiness or misery.... I refused, and I did right in refusing, to create a companion for the first creature. (187)

But the doctor's decision to break faith with his creature does not break the bond between them. Instead, it locks creator and creation into an irremediably destructive relationship consuming the remainder of both their lives.

Thus the pattern of the novel clearly raises two closely related questions:

- (1) What do human beings owe to nonhuman, human-created species;
- (2) How do such obligations weigh against those owed to our own human species?

In exploring these issues, the novel moves through three stages. First, Dr. Frankenstein, unhindered by moral scruples, seeks to exercise scientific expertise without limit. Fearing public scrutiny might prohibit his quest, he conducts his experiments in secret. In simply arrogating to himself a private right to experiment as he pleases, he implicitly rips himself out of the sustaining nexus both of nature and of human community. He gives absolutely no thought to the social responsibilities he will incur if he should, in fact, succeed.

In stage two, confronted by a being capable of articulating its own needs from its own point of view, he becomes aware of his duty to enable this creature to achieve satisfaction on its own terms. He now accepts his creature's claim to rights and contracts in acknowledgement of the direct obligations owing to the creature.

However, in stage three the doctor retreats to an anthropocentric fear that the creature's self-sufficiency might prove inimical to his own species continuance. Moved by what he sees as species loyalty, he refuses to allow his creature to achieve reproductive capability.

Dr. Frankenstein's Characteristics

Separately and together, the stages of Frankenstein's story illustrate many aspects of the mainstream Western attitude toward nature. Dr. Frankenstein explicitly seeks to justify his practice by reference to the traditional utilitarian position that maximizing human happiness so far outweighs other values that the nonhuman must be properly regarded as just a resource for the human. Dr. Frankenstein seems to be working from within the mainstream tradition uniting the presumption that humans are entitled to dominate the earth with values

supporting scientific progress, capitalism and what Lugones and Spelman² have named cultural imperialism.

Furthermore, although Dr. Frankenstein specifically rejects religion, his uncritical acceptance of what must be recognized as the presumption that human good is entitled to dominate over the good of the nonhuman—whenever these are in conflict—has sources not only in the secular humanist tradition deriving from the Greeks and the scientific outlook but also in the repeated authorizations of the Old Testament. Here, male and female are appointed to “subdue” the earth and “rule over the fish in the sea, the birds of heaven and every living thing that moves on earth” (Genesis 1:28-9). Humans as a species are given dominion over all nonhuman occupants of every environmental niche. However, this general authorization is transformed in the Garden of Eden story. There the Creator empowers Adam, the male human, to name all other creatures, including woman. In this version the male has primacy, the female being created to make him happy, to be his companion, to fulfill his need for companionship (Genesis 2: 19-23).

After the Flood Noah and his sons are given the most sweeping authorization of all:

Be fruitful...and fill the earth. The fear and dread of you shall fall upon all wild animals on earth, on all birds of heaven, on everything that moves upon the ground and all fish in the sea; they are given into your hands. Every creature that lives and moves shall be food for you; I give you them all, as once I gave you all green plants...But you must be fruitful ...swarm throughout the earth and rule over it. (Genesis 9: 1-7)

Rejecting religion in his commitment to rationality and science, Dr. Frankenstein nonetheless unreflectively accepts the Biblical premise which authorizes man, the male, to rule over the earth, to use it and every living creature in every environmental niche to increase human thriving. His presumption is complemented by the anthropocentric premisses of the Greek and Roman world which held, as Aristotle bluntly put it, that “other animals exist for the sake of man...”³

Dr. Frankenstein also illustrates other aspects of the mainstream Western attitude toward nature. In Stage I he is the scientific expert who assumes a right to unmonitored experimentation, presumably believing

that the quest for scientific knowledge is a self-legitimizing good.

Life and death appeared to me ideal bounds which I should first break through, and pour a torrent of light into our dark world. (45)

Because he presumes his quest good in itself, he unquestioningly pursues exploitation of every scientific possibility, acting as if unhindered by

- (a) any moral reflection on probable consequences,
- (b) any respect for the sensibilities of the non-scientific public, or
- (c) any sense that the nonhuman might itself be owed respect.

In the body of the novel, the first and last of these three evasions receive explicit treatment. In Stage II the creature argues Dr. Frankenstein into seeing that the nonhuman might be owed respect. But the doctor, after promising to provide the creature with companionship of its own kind, reflects further on the probable consequences of this action and in Stage III comes to sacrifice his own chances of happiness to a moral heroism aimed at safeguarding humanity. Since the middle term, respect for the sensibilities of the nonscientific public, never receives its due, the pattern of obligation is never fully explored or mapped. But much can be learned nonetheless.

Obligation to the Nonhuman

Stage I

In his total disregard of any obligations concerning the treatment of nonhuman beings, Frankenstein may be seen as a Cartesian, for Descartes so fully distinguished the body and mind that animal suffering was considered an oxymoron. In the Cartesian view, “the body is regarded as a machine which, having been made by the hands of God, is...better arranged”⁴ but no different in kind from machines produced by human ingenuity. Indeed, since only the human soul, the ghost in the machine, earns living human bodies special treatment, even human bodies, lacking souls, merit little intrinsic respect. The evidence of the senses, human or

animal, must be rejected as untrustworthy in comparison with the purely rational. So, human technology—insofar as it is applied to the nonhuman—is freed of nontechnical (i.e., moral) limits.

Post-Cartesian technological progress may be described as the efficient use of natural systems viewed as machinery. As Susan Griffin⁵ has observed, this technological outlook promotes its own verification. Where mountains are seen as storehouses of coal, one acts reasonably when one efficiently removes coal by cutting away half the mountainside. It is an unintended and inconsequential side effect that the mountain erodes; chemicals pollute its streams; fish, plants and animals die. Technological enterprise fully succeeds on its own term—the mountain is just what Cartesian science believed it actually was: dead matter with a value adequately determined by the price paid in the human commodities market.



Richard Huber, *Treasury of Fantastic and Mythological Creatures*. New York: Dover, 1931.

Stage II

If Dr. Frankenstein is the scientist-technician bending dead matter to his will, his creature may be seen as that estranged and technologically alienated Other, the nonhuman given the fictive gift of speaking about its needs and potential. When they first confront each other on Mont Blanc, they are already caught in a mutually destructive pattern analogous to the destructive practices of industrial polluters who fill their own environment with carcinogens. Only here, in the novel, this nonhuman, alienated other excels at self-expression. It articulates an alternative point of view, rejecting the assumption that what is not human is therefore to be understood as dead matter. Instead, it reminds us that it is human irresponsibility that has brought us to this pass.

Were this all, the interlude on Mont Blanc might be seen as a call to reembrace stewardship, caring and concern for the nonhuman on the grounds of the ultimate dependence of the whole of nature on our exercise of rule for the common good. From this perspective, the creature's charge to Doctor Frankenstein resembles Joel Feinberg's analysis of the duties of stewardship where he argues:

Individual animals can have rights but it is implausible to ascribe to them a right to life on the human model. Nor do we normally have duties to keep individual animals alive or even to abstain from killing them provided we do it humanely and nonwantonly in the promotion of legitimate human interests. On the other hand, we do have duties to protect threatened species, not duties to the species themselves as such, but rather duties to future human beings, duties derived from our housekeeping role as temporary inhabitants of this planet.⁶

Until very recently, objections to the presumption that natural resources are simply to be exploited without limit largely followed versions of this principle of indirect obligation, where all value remains centered on human instrumentality. The value of the nonhuman derives from the human recognition that we cannot survive the loss of (some crucial aspects of) an increasingly fragile biotic substrate. The rainforest is valued because it provides us with oxygen; the biotic diversity within it has provided us with pharmacological treasures; and its unknown, uncatalogued species might well provide future generations with far more than previous generations have already exploited. Restraint follows from the specifically anthropocentric perspective underlying Locke's constraining the natural right to property with conditions rejecting wanton waste, and the Lockean demand that humans leave enough for the heritage of humankind—quantitatively and qualitatively—as they themselves enjoyed. In short, constraints on our behavior with respect to the nonhuman ultimately derive from our estimate of what is owing to the human.

With respect to animals who display sensitivity to pain and suffering, the anthropocentric perspective is best captured by Kant's explanation of an "indirect obligation" which translates caring for animals into a duty to humans.

[A man] must practice kindness towards animals, for he who is cruel to animals becomes hard also in his dealings with men.⁷

Indeed, even Frankenstein's creature declares itself willing to accept the anthropocentric perspective whereby obligation to the nonhuman derives indirectly and must accord with obligation to the human. In asking Dr. Frankenstein to provide it with a companion like itself, it describes its vision of happiness as one which will not injure any human. From that perspective it warns Dr. Frankenstein:

The picture I present to you is peaceful and humane and you must feel that you could deny it only in the wantonness of power and cruelty.(126)

So, the principle cited by Feinberg, the principle which requires humans to use power nonwantonly, to serve as stewards who benefit the nonhuman so as to serve the human, grounds the claim made by the creature on its creator. This fully accords with the Kantian principle of indirect obligation to the nonhuman. Humans ought to treat animals with clemency because to do otherwise results in a human hardening that will affect human-human interactions. This principle, were it to persist unmodified, would replace the criterion of efficient commodification with a principle of stewardship. The relationship of dominion would be interpreted as excluding exploitation but including nonwanton, caring use.

We can see this as the better alternative inasmuch as human actions premised on an unlimited exploitation of the nonhuman have already distorted the earth's self-regulating biotic net into mutually destructive patterns. However, actions premised on a duty of stewardship for the sake of human good, while they would limit exploitation, would in their own way also distort the bionet. Whether agricultural practices are chemically dependent or utilize biological pest controls, they effectively change the environment. Domestic animals obviously have been molded to dependency on the human as they were bred to serve human designs. Naturally occurring plants have been selectively bred and cross-bred till they too depend for viability on human stewardship.

Remarkably, even when the nonhuman is not actively molded to achieve some human good, human

control/stewardship has become inescapable. Today, even the survival of wilderness depends on human decisions, a form of wilderness management. Endangered species persist only through human interventions reparative of earlier human interventions. As science enables human technology to make the nonhuman into an other, and to distort further the earth's bionet, its future sustainability becomes, as the creature puts it, "bound (to us) by indissoluble ties."

But Frankenstein's creature, though it apparently accepts the anthropocentric outlook, nevertheless demands that its maker *directly* recognize its needs in such a way that this new lifeform need not remain within even a benevolent stewardship. Together with a companion, it wishes to depart and follow its own lights. If it undertakes to avoid humanity so as to do no damage to human activity, it also proposes to be free from the bond of its origin, the bond of human stewardship which validates human dominion. Hence, in arguing for a chance to work out its destiny by means of a nonharmful independence, the creature touches on another possible way to formulate the obligation of humans to the nonhuman. From this perspective humans ought to recognize limits to their treatment of the nonhuman because nonhuman entities have claims directly on us—the principle of direct obligation to the nonhuman. It is this second principle that Aldo Leopold, in his famous essay, "The Land Ethic," refers to as "a matter of biotic right."⁸

Dr. Frankenstein, in this second stage of the novel, is challenged to face a crucial issue which in current ecological thinking is embodied in two radical alternatives:

- 1) expanding the anthropocentric circle so that nonhumans (and exploited humans) can both be accorded moral status and treated as recipients of friendship by right rather than by sentimental grant or
- 2) replacing completely the anthropocentric principle itself.

The challenge lies, to cite Tom Regan, in establishing an "ethic of the environment rather than an ethic for the use of the environment."⁹ In posing the request to be freed from stewardship to find its own happiness, the creature calls on us to investigate

What loci of value command moral respect? Of what significance...are such characteristics as being alive, sentience, having interests, autonomy, the capacity to participate in a moral community, organic or systemic integrity and flourishing?

Fictional though it may be, this creature possesses every element which has been suggested as a locus of value commanding moral respect. Demonstrably alive and sentient, it recognizes and defends its own interests. For good or for evil, it exercises autonomy as humans do. Moreover, it demonstrates the capacity to participate in a moral community as well as an organic or systemic integrity and the capacity for flourishing. On this basis it demands of its creator no less and no more than the relevant necessities of its flourishing. At a minimum, it requires a companion, a female of its own kind. In effect, it asks of Dr. Frankenstein that he be as benevolent a creator as God was to Adam in the Garden of Eden. But the Creature intends to be an Adam that willingly chooses expulsion from that garden. It does not ask for Frankenstein's continued stewardship but for equal rights to self-determination.

Having all of the characteristics which supposedly underlie the human claim to dignity and value, i.e., being alive and sentient, possessed of intrinsic interests, capable of exercising autonomy, capable of participating in a moral community, possessed of organic or systemic integrity and the capacity for flourishing, the creature would most likely be accounted "human" on Kantian grounds. But Dr. Frankenstein, speaking for his time and very likely for our own, cannot account a creature of his own devising, a product of bioengineering rather than of human birth, as a being of intrinsic value, commanding respect like himself.

Stage III

In his ultimate denial of the creature's demands Dr. Frankenstein implicitly refers to the subtext of much current ecological debate: what do we owe future generations? In light of the creature's potential we must ask who comprises these future generations: is it only human future generations?

In this regard, the creature raises issues which are especially relevant in light of the increasing potential of biogenetic engineering. If we create some complex new form of life, capable of autonomy, development

and participation in a moral community, what will be our responsibilities to this new species? If we fear such a creature while it is still dependent on our goodwill, does that excuse us from the obligation to forward its thriving, even if we fear that its species thriving might eventually threaten the continued thriving of our own species, make our dominion over the nonhuman unsustainable, or even replace us in the biotic net which, by our own agency, is no longer independent of our stewardship and goodwill?

And if an engineered life-form has some, but not all, of the relevant characteristics—so that it is capable of flourishing but incapable of participating in promise-keeping or the other institutions of a moral community—should its capacities suffice to command respect from us? Dr. Frankenstein's solution precludes the latter problem, for he chooses to privilege human thriving most of all and to deny the creature any chance at happiness if that poses the risks of reproduction and subsequent species independence from human control. The unfortunate doctor maintains the correctness of his choice until the very end. His choice is presented as heroic—a refusal to betray the greater good. Yet the author gives the final word to the creature, who claims with reason that "Blasted as thou wert, my agony was still superior to thine." The scientifically misshapen creation shows a degree of understanding superior to its maker's.

There is in this a degree of hope and a clue to the persistent wrongness which, unnoticed, distorts all the phases of Dr. Frankenstein's development throughout the novel. As we noticed earlier, he unquestioningly pursues exploitation of scientific possibility, acting as if unhindered by

- a) any moral reflection on probable consequences,
- b) any respect for the sensibilities of the nonscientific public, or
- c) any sense that the nonhuman might itself be owed respect.

Confronted by the creature, he is forced to acknowledge that at least some portion of the nonhuman might itself be owed respect. Persuaded to fulfill the creature's needs, he reconsiders and then reneges, not for personal gain or glory but out of species loyalty—heroically accepting the worst because for the first time he does engage in moral reflection on probable consequences.

However, never once throughout the novel does this scientific expert acknowledge or show any sensitivity to the sensibilities of the nonscientific public.

Dr. Frankenstein has progressed from a paradigm of exploitation to one of stewardship as the proper mode by which humans would exercise dominion over the earth. But the question remains to be asked: do humans, *per se*, legitimately exercise dominion over the earth (and the nonhuman inhabitants thereof) either as exploiters or as good stewards? With respect to this issue, current practice, whether exploitive or stewardlike, reveals an obfuscation. Not every human is dominant over the earth and the nonhuman. Only some, dominant groups instantiate that position. These dominant groups alone generally dominate over the earth, the nonhuman and that portion of the human which is not part of the dominant group. In practice, science coordinates with capitalism and "development" to promote institutions in which some human beings are, like much of the "natural world," exploited as resources for others. In order to claim that human domination is human, the dominant group must falsely universalize its own position and claim that what is true of it is true of humans generically.

This aspect of technological thinking can be called cultural imperialism. Young¹⁰ has described this process as marking out

the difference of women from men, American Indians or Africans from Europeans, Jews from Christians, homosexual from heterosexuals, workers from professionals...reconstructed largely as deviance and inferiority. Since only the dominant group's cultural expressions receive wide dissemination, their cultural expressions become the...universal, and thereby the unremarkable. Given the normality of its own cultural expressions and identity, the dominant group constructs the differences which some groups exhibit as lack and negation. These groups become marked as Other.

Ecofeminists bring together feminist insight into cultural imperialism with ecological concern for the environment to structure a critique of technological practices that tend toward the commodification of otherness. Unlike the ecological positions which promote recognition of human obligations of stewardship toward the nonhuman, for whatever reason, ecofeminists seek to establish an anti-hierarchical

understanding of life as an interconnected web: We are bound by indissoluble ties. But we must still think about whether our situation ought to be one of dominion, be it a rule of exploitation or the more moderate rule of stewardship. Alternatively, would it be better to strive for a relationship captured by some less hierarchical description?

Dr. Frankenstein will not consult the superstitious mob whose happiness he decides to protect. His elitism is falsely generalized to humanity. But would the outcome have been different if he or the creature had petitioned humanity directly?

As depicted, the nonscientific public hardly commands respect. It abuses the creature only because it perceives it as ugly. But rejection of the Other, thanks to a body aesthetic that produces aversive reactions, is not limited to Dr. Frankenstein's creature. Ageism and ableism are also connected with a deeply felt aversion and nervousness evoked by the presence of the old and the disabled in terms of a body aesthetic, a culturally constructed sense so pervasive that members of culturally imperialized groups often exhibit themselves symptoms of aversion toward members of their own and other oppressed groups. Blacks, for example, not infrequently differentiate in a color-valoring manner between "light-skinned" and "dark-skinned."¹¹

If, as seems probable, the perception of ugliness is, with respect to the creature, a perception of otherness which comes so close to our own somewhat shaky boundaries as to evoke aversion and disgust, then the creature could scarcely hope for just treatment if Dr. Frankenstein did ask other anthropocentric, fearful humans to help him determine its fate. Such consultation would have done little more than diffuse the resultant guilt with a fallacious appeal to the authority of the many. However, it seems probable that the habit of non-consultation reflects a habit of noncooperation and a devaluing of the positive potential of political discourse, a presumption of the superiority of an expert's opinion. This disrespect for the other, be it human or nonhuman, is an implicit, unremarked wrongness which ultimately pervades the text and distorts possibilities. Were it to be replaced by a willingness to cooperate with those characterized by "otherness" from the perspective of the technologically proficient, scientifically empowered human, then perhaps dominion might be replaced with sharing in ways that would sustain us, human and nonhuman, with more compassion and clemency and justice than Dr. Frankenstein could muster.

A partial version of this paper was presented at the Third Conference on Agriculture, Food and Human Values Society, *Varieties of Sustainability, Reflecting on Ethics, Environment and Economic Equity*, Asilomar Conference Center, Pacific Grove, California, May 10-12, 1991.

Notes

¹ All references to *Frankenstein* are to the Pyramid Book edition, 1957.

² M. C. Lugones and Elizabeth V. Spelman, "Have We Got a Theory for You! Feminist Theory, Cultural Imperialism and the Demand for 'the Women's Voice.'" *Women's Studies International Forum* 6 (1983): 573-81.

³ Aristotle, *Politics*, Bk I Ch.8 1.16.

⁴ René Descartes, "Discourse on Method," in *Philosophical Works of Descartes*, Vol I translated by E. S. Haldane and G. R. T. Ross (New York: Cambridge University Press, 1967) reprinted in Tom Regan and Peter Singer, eds. *Animal Rights and Human Obligations* (Englewood Cliffs, N. J.: Prentice-Hall, 1976) p.61.

⁵ S. Griffin "Split Cultures," in Judith Plant, ed., *Healing the Wounds* (Philadelphia: New Society Publishers, 1989) pp. 11 ff.

⁶ Joel Feinberg, "The Rights of Animals and Unborn Generations," reprinted in T. Mappes and J. Zembaty, *Social Ethics, Morality and Social Policy* (New York: McGraw Hill, 1987) p. 492.

⁷ Immanuel Kant, "Duties to Animals and Spirits," in *Lectures on Ethics*, translated by Louis Infield (New York: Harper and Row, 1963) reprinted in *Animal Rights and Human Obligations*, p. 122.

⁸ Aldo Leopold, *A Sand County Almanac* (New York: Ballantine Books, 1970) p. 247.

⁹ Tom Regan, "The Nature and Possibility of an Environmental Ethic," *All That Dwell Therein* (Berkeley: University of California Press, 1982) p. 188. Also see, Holmes Rolston III, "Is There an Ecological Ethic?" *Philosophy Gone Wild* (Buffalo: Prometheus Books, 1986), p. 12 and Joanna Macy, "Awakening to the Ecological Self," in *Healing the Wounds* pp. 201-212.

¹⁰ Iris Marion Young, *Justice and the Politics of Difference* (Princeton, N. J.: Princeton University Press, 1990) pp. 59ff.

¹¹ *Ibid.* p. 146.

Response: Dr. Frankenstein and Today's Professional Biotechnologist: A Failed Analogy?

Laura Westra
Windsor University

1. Introduction

I found this paper to be both instructive and problematic at the same time. Instructive, because although I had of course heard of Frankenstein, I had no direct acquaintance with the actual work, and this paper emphasized for me many issues relevant to my own research. The "problematic" aspect arose primarily because of the number of topics covered in the paper: questions concerning bioengineered species, the meaning of "stewardship" and of "sustainability" against a background of environmental abuse, finally, even the topic of "ecofeminism" introduced in the final portion of the paper. Clearly there are links among all of these topics: they are not unrelated. The question is how much of all of that can be usefully treated in one brief paper and in an even briefer response.

Thus, in the interest of both brevity and focus, I will focus, generally speaking, primarily on the analogy Dandekar and Zlotowski perceive between the original Frankenstein and his counterparts in bioengineering today. Starting with a sum-up of Dandekar and Zlotowski's analysis of the character of the fictional Frankenstein, I will then turn to a brief presentation of the reality of today's biotechnology, before assessing the analogies and disanalogies. From that standpoint, I



DISCUSSION