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Posthuman Biopolitics

The Science Fiction of Joan Slonczewski

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PREFACE

A sustained output of major science fiction by a working scientist is a fairly rare phenomenon. Joan Slonczewski, the Robert A. Oden, Jr. Professor of Biology at Kenyon College, has been producing noteworthy novels for over three decades. Her breakout work of 1986, *A Door into Ocean*, is widely hailed as a modern classic. In 1987, it won the John Campbell Memorial Award for Best Science Fiction Novel. In 2012, Slonczewski received a second Campbell Award for her most recent novel, *The Highest Frontier*, published in 2011. All the while, Slonczewski has been pursuing research with her undergraduates through laboratory studies and fieldwork on matters from bacterial pH stress to cold-adapted microbes from Antarctica, and teaching courses on microbiology, virology, and biology in science fiction. She is also the co-author of *Microbiology: An Evolving Science*, published by Norton, a core microbiology textbook for undergraduate science majors, currently in its 4th edition. Since 2011, Slonczewski has blogged at ultraphyte.com.

A substantial narrative entity stands in the midst of Slonczewski's fictional oeuvre. The Elysium Cycle assembles four largely freestanding but intrinsically interconnected novels, beginning with *A Door into Ocean*, published over fifteen years. The profound world-building that makes *A Door into Ocean* such a memorable achievement—the integrated ecosystems indigenous to the planet Shora, the weird glamor and winning ways of its all-female inhabitants, the Sharers—was clearly too great to let go. Slonczewski's creative zest is abundantly evident in the way that each further installment of the cycle—*Daughter of Elysium* (1993),

The Children Star (1998), and *Brain Plague* (2000)—brings forth a radically new human architecture or planetary ecology, constantly adding detail to the complex texture of her part of the future galaxy. And as Slonczewski explains in the interview in this volume, a sequel to *The Highest Frontier* is forthcoming, but “has been somewhat sidetracked by the events following 11/9.”

The broad but modest critical reception of Slonczewski’s science fiction indicates the need for a volume such as this, dedicated to a deep dive into the author’s canon. *Posthuman Biopolitics* aims to ratify and consolidate the professional literature on Slonczewski’s creative accomplishment and to suggest further lines of engagement for its critical, cultural, and theoretical treatment. We present the first collection of essays dedicated to Slonczewski’s accomplishments as a writer of hard science fiction with a strong biological inflection. The diversity of the perspectives assembled here testifies to the breadth and depth of her vision and her work. This volume collects for critical consideration the key themes constellated by Slonczewski’s characters, plots, and storyworlds: feminism in relation to scientific practice; resistance to domination; pacifism versus militarism; the extension of human rights to nonhuman and posthuman actors; biopolitics and posthuman ethics; and symbiosis and communication across planetary scales. These essays also locate a persistent motif in Slonczewski’s science fiction, her adroit depiction of sites and modes of social negotiation, what the philosopher Isabelle Stengers calls “diplomacy.” Slonczewski’s narratives are masterful imaginings of cultural ecologies that can bridge radical differences and defuse cycles of violence. It is fair to say that our need for the reflective ethical practice of Joan Slonczewski’s science fiction has never been greater than it is as we approach the challenges of the 2020s.

We wish to thank Cary Wolfe and the Society for Literature, Science, and the Arts (SLSA) for helping to make this volume possible. Under Wolfe’s conference direction, SLSA underwrote Slonczewski’s attendance at its annual meeting in Houston, Texas, in 2015. This volume came out of two panels there organized by Bruce Clarke and dedicated to Slonczewski’s science fiction. Thanks to Stacy Alaimo and Dirk Vanderbeke for their participation on those SLSA panels and to Caleb Kebede in the John W. Kluge Center at the Library of Congress for editorial support. Additional thanks to Steven Shaviro for helpful guidance. Finally, Sherryl Vint’s support of this project has been indispensable to its arriving at its current form.

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Lubbock, USA

Bruce Clarke

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Joan Slonczewski is the Robert A. Oden, Jr. Professor of Biology at Kenyon College. Her novel *A Door into Ocean* won the John Campbell Memorial Award for Best Science Fiction Novel in 1987. In 2012, Slonczewski received a second Campbell Award for her most recent novel, *The Highest Frontier*, published in 2011. Slonczewski pursues research on matters from bacterial pH stress to cold-adapted Antarctic microbes, and teaching courses on microbiology, virology, and biology in science fiction. She is the co-author of *Microbiology: An Evolving Science*, published by Norton, a core microbiology textbook for undergraduate science majors, currently in its 4th edition. Since 2011, Slonczewski has blogged at ultraphyte.com.

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CHAPTER 1

An Interview with Joan Slonczewski

Joan Slonczewski

This interview collects a virtual group conversation between the author and the contributors. It ranges through a series of topics that cover Slonczewski's scientific and fictional fields of interest: microbes in particular, humanity and its future prospects in general, science fiction as a literary genre, and her own writing. "Microbes have been my business since graduate school." This part of the conversation ranges across issues from the microbiome and probiotics to symbiosis, extremophile metabolisms, and the corporate medical complex. The biomedical orientation of her science is one motivation of her consistent creation of caregivers as main characters. Regarding the status of humanity in a posthuman world, Slonczewski practices a particularly humane variety of the posthuman imaginary. Human history is never far from being the ultimate referent of her chronicles of the future. In keeping with these cultural and material registrations, socioeconomic disparities and ethnic tensions are also primary players in her biopolitical scenarios. But such modes of circumstantial difference are not fundamental and may be overridden, always with difficulty,

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by the creation of spiritual mutuality. Slonczewski expresses her posthumanism by questioning the contingencies of selfhood. Slonczewski's fiction consorts with various echelons of sentient machines, but she distinguishes her approach from the cyberpunk trends contemporary with her writing of the Elysium Cycle. She views cyberpunk's oppositional and gendered splice between the organic and the mechanical as having been resolved in actual scientific practice by refinements in molecular biology that open life forms to vistas of physical and chemical manipulation. Addressing the recurrent theological themes throughout her fiction, Slonczewski discusses her most recent novel, *The Highest Frontier*, and drops some hints about its eventual sequel.

MICROBES

- Recently science and technology studies (STS) scholars have begun to study the implications of the human microbiome, how the human cannot be understood in detachment from the microbiome in which we reside (and which resides in us), leading to new conceptualizations such as the “holobiont” or “supraindividual” to try to acknowledge how centrally “we” are multi-genomic organisms. This perspective, it seems, has already shaped a lot of your fiction. What are your thoughts about the challenges of writing microbe characters, both before and after the dissemination of these recent findings concerning the role of the microcosm?

Joan Slonczewski: Microbes have been my business since graduate school. The main challenge for me in writing microbial characters is getting the science-fiction millennial critics to engage it. *Brain Plague* was ahead of its time, but the critics said it wasn't possible (and went on to the next space-warp adventure). Today, in my own lab we are showing how microbes, the “microbial society,” plays its part in the human being. Even viruses now are part of our microbiome; about eight percent of our genome makes our own endogenous viruses. Now that new pronouns are coming in (our student life director gave us a list of a dozen, from ze to hirs) I've switched to “they, theirs” in recognition of our microbial community. Thus, “Robert Koch set up an anthrax lab in their patients' waiting room.”

- Staying with the topic of microbes, STS scholar Heather Paxson has written about “good microbes” to reposition how we think about food cultures and health, using “raw” cheese to conceptualize what she calls the “microbiopolitics” of how to live with microbes, good and bad. She has also been critical of a more recent turn toward “post-Pasteurian cultures” celebrated by some people, coming out of a recognition of the positive benefits of living with some microbes (Paxson 2013). Do you have any comments on “microbiopolitics” or the “post-Pasteurian” as they relate to your work, both as a scientist and as a writer?

JS: Yes, the vast majority of microbes do us no harm, and in fact enable us to live. But the few that cause trouble (diphtheria and tuberculosis, etc.) kill vast numbers of people. So, the trick is to find a middle path. Pasteurization itself is a moderate path, in that the relatively brief heat treatment kills the worst pathogens without sterilizing everything.

The trouble with probiotics is that most people, and most commercial manufacturers, have no idea what they’re doing. Which kind of microbial communities are actually good for us? Theory is lacking; we can only try things and see what works. Like fecal bacteriotherapy—after weeks of the runs with *C. diff*, one is willing to try anything, and sure enough, it works. My own research is now looking at how our human body can control our own microbiomes, to moderate their abilities such as drug resistance. We find that aspirin metabolites, which were common in preindustrial vegan diets, can select for microbial populations that are drug sensitive—and exclude drug resistant pathogens. Microbiology is even more amazing than science fiction.

- In a 2003 interview published in *Nature*, when asked *What book has been most influential in your scientific career?* you replied: “The works of Lynn Margulis on symbiogenesis have had a major impact on my scientific vision. The evolution of predatory protists into multiple endosymbionts is more amazing than most science fiction.” How would you now assess her importance for our current understanding of the microcosm in relation to the biosphere?

JS: Lynn’s insights on symbiogenesis were remarkable at that time. She did few experiments, but observed the natural world. When she began

doing science, symbiosis was considered a “special exception” to the central role of competition in shaping life. Today, we increasingly find symbiosis at the center along with competition. The human body includes one’s gut microbes as essential partners, responsible for modifying our nutrients and producing our neurotransmitters.

- Our current appreciation of symbiosis and of Margulis’s prescience concerning its importance rests on more recent “dry” techniques of genetic sampling and sequencing that to some extent are opposed to her preference for “wet” biology and observation of phenotypes in the field.

JS: The most exciting work today combines DNA with “wet” biology. For example, the microbes I brought back from Antarctica were living organisms, but we knew no way to grow them in culture. So we sequenced their DNA to gain clues as to what they could do. We discovered some of the samples were cyanobacteria, chloroplast-like bacteria that fix carbon and produce oxygen. But one sample was mostly purple bacteria—a different microbe that can grow without oxygen and produces hydrogen. Because the DNA told us that, we were able to devise a culture medium to grow this strange purple life form. Our knowledge of microbial symbiosis today goes beyond what even Margulis imagined. For instance, we find retroviruses integrated throughout our genomes, and the viral genes have evolved new essential functions in our cells. The human embryo actually generates viral particles as part of normal development.

- John F. Stolz has written about “a robust biogeochemical cycle and ecology based on arsenic. That microbial arsenic cycling was important in the evolution of life has been further bolstered through molecular investigations of arsenic based ecosystems” (Stolz 2017). Were “arsenic-based ecosystems” on the horizon of biological knowledge when you made this form of biochemistry indigenous to the biosphere of the fictional planet Prokaryon in the later 1990s?

JS: In imagining the biosphere of Prokaryon, I was aware of the phenomenon of arsenate respiration. Arsenate respiration refers to the use of arsenic-oxygen compounds to receive electrons, in place of diatomic oxygen gas. What has not yet been demonstrated is the arsenic replacement of

phosphorus in metabolism, such as the phosphorus atoms of ATP. Arsenate bonds are too easily broken, under physiological conditions, to replace phosphorus in most phosphorylated compounds. Nonetheless, one might imagine such a scenario in science fiction.

- An issue frequently raised in recent biopolitical criticism is the idea of the corporate medical complex taking greater control of our bodies. One might argue that the main character of *Brain Plague* is coerced—even co-opted—into the community of “carriers.” And this topic seems to surface in fiction often when immortality is on the table (one thinks especially of Jim Gunn’s *Immortals*). Do you see the symbiosis of different species in the Elysium novels—Sharer medicine or the manipulation/negotiation of microbial viruses—as a viable answer to what might be a medical complex grown too big and unsustainable? A potential for grassroots response to corporatized medicine?

JS: The corporate medical complex is in the background of *Brain Plague*. The doctor-machines are not entirely good. The powerful ones want to control humans by drugging them. The more modest community-based doctors find themselves perpetually putting out fires. The lead carriers, Daeren and Andra, I see as community organizers, trying to haul in the drug addicts and save them despite themselves.

HUMANITY

- Another particularly compelling biological idea that you’ve worked into the Elysium novels is the unit of selection. The tiny masters of *Children Star* and the micros of *Brain Plague*, in particular, seem to imply that humanity can be found just about anywhere.

JS: I’m intrigued by the idea that perhaps humanity (like microbes) can be found anywhere. The unit of natural selection keeps getting larger, the more closely we look. Is it possible that a swarm of smaller creatures could develop a network that achieves a conscious existence? Some researchers argue that a termite mound has this capability.

- Good science fiction makes us think through this idea in terms of recent events, for instance, the shooting and protests in Ferguson, Missouri in August 2014. I wonder what kind of humanity, say, a Sharer might find in these situations.

JS: The Sharers would see in Ferguson a public health crisis. They would say that all the parties involved are “sick children.” But the Sharers are a small community with an exceptionally advanced social philosophy. *Brain Plague*, published in 2000, does show what happens when prejudice leads to violence in the Underground—while the wealthy, who live literally “up” levels, don’t care. They don’t care until the pathogenic microbes find their way up to the top. *Brain Plague* effectively predicted the socio-economic system we now inhabit—rich versus poor, the divide amplified by sentient machines, and everywhere the dangers of obsession and addiction.

- And, more importantly, would you say that it is the grassroots resistance or the power of the city-state that we need to put under the microscope, like *E. coli* in an anaerobic environment? The emphasis on these tiny “masters” attaining equality, in helping to populate an entire world or universe full of protectors—incidentally solving the “who will watch the watchmen?” problem—suggests a political and didactic component of these novels. What level of complexity should we be looking at, and how do the visions of biological science in these novels suggest a means to address it?

JS: The microbial politics of *Brain Plague* was intentionally drawn to reflect (very crudely) historical shifts in human political thought over the past couple of centuries. Since one microbial “generation” is a day, four generations are a microbial century, forty generations a millennium. That’s plenty of time for philosophy. I had a lot of fun with this. The first microbial community starts with a “my people, my god” mentality. Then they discover democracy, liberalism, socialism, and totalitarianism (the pathogens). Ultimately, universalism—exporting democracy while importing immigrants. The smart ones, of course—the “brain drain.”

- Ontological diversity is celebrated in your storyworlds. However, philosophical notions or fictional agents of outright or utter alterity seem to get no final purchase even in these largely extraterrestrial settings. Would you agree that, in your work, the self is the sign of the human, no matter in what form it may appear.

JS: My entire writing career has focused on the question, “What does it mean to be human?” The answer I’ve found is, whatever can speak for itself and say, “I am.” That is, whatever defends its own identity. The question turns out to be circular; a logical consequence of the Turing test is that whatever entity can convince us that it’s human, in effect is. In Heinlein’s *Have Spacesuit—Will Travel*, the protagonist ends up defending the right of the entire human race to exist. He tries various arguments—great literature, great science and architecture—none of which convinces the various intelligent entities of the galaxy. Finally, he simply argues that because we demand to exist, we have that right. In a more radical way, the Sharers of Shora demand, or rather assert the same. More radical yet, the microbes of *Brain Plague* ultimately assert that “we are you, and you are us.”

- Do you mean to define such a “defense of identity” strictly in relation to the capacity for speech, as that capacity may be possessed by whatever natural or artificial being “can speak for itself and say, ‘I am’”? One might consider that all living beings have some means of self-maintenance or autopoietic impulse to maintain the integrity of their living processes. Are you saying that the threshold of “the human” is the capacity, when confronting other beings similarly possessed of abstract linguistic understanding, to utter a demand to exist? If that is the case, the microbes of Prokaryon, in their native linguistic competence, are as “human” as the humans they infect, and with whom they are subsequently able to enter into modes of social communication.

JS: Yes, I argue that to be human is to utter a demand to exist. This idea emerges from ancient philosophy. Aristotle calls humans the “political animal.” The demand to exist is perhaps the most fundamental political argument; if you don’t exist, you have no politics. I do think the microbes of Prokaryon and *Brain Plague* are as human as their human hosts. To