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Science, Justice, Science Fiction: A Conversation with Kim Stanley Robinson

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Kim Stanley Robinson's stature in the field of science fiction goes well beyond the usual sorts of accolades and distinctions. In a genre so often dominated by repetitive visions of dystopian surveillance states and inevitable robot apocalypses, Kim Stanley Robinson is among the proud few who still assert that most Utopian and most science fictional of dreams: that another world is possible. In his fiction, Robinson has often approached ecological themes from a future-historical perspective. In his first novel, The Wild Shore (1984), he imagines a United States that has been bombed back to the Dark Ages, surveilled from the coastline by a coalition of nations eager to prevent any American reunification; decades later, a character who lived through the bombing explains the contradictions in his own memory of America (our present):

> *…America was huge, it was a giant. It swam through the seas eating up all the littler countries—drinking them up as it went along. We were eating up the world, boy, and that's why the world rose up and put an end to us. So I'm not contradicting myself. America was great like a whale—it was giant and majestic, but it stank and was a killer. Lots of fish died to make it so big. Now haven't I always taught you that?*[1]

In another early book, Pacific Edge (1988) Robinson advances what might be a sad maxim of human history, and perhaps even its epitaph: "Every culture is as wasteful as it can afford to be."[2] But Robinson is never as cynical as that quote implies: he has spent his career in service of the Utopian form. In a recent interview with the website BLDGBLOG, Robinson spoke about the way the idea of permaculture, borrowed from Australian agriculturists Bill Mollison and David Holmgren, is put to work in his novels and politics:

> *We should take the political and aesthetic baggage out of the term utopia. I've been working all my career to try to redefine utopia in more positive terms— in more dynamic terms. People tend to think of utopia as a perfect end-stage, which is, by definition, impossible and maybe even bad for us. And so maybe it's better to use a word like permaculture, which not only includes permanent but also permutation. Permaculture suggests a certain kind of obvious human goal, which is that future generations will have at least as good a place to live as what we have now.[3]*

Permaculture rejects the neoliberal paradigm of "sustainable growth" in favor of what it is essentially raw futurity, a politico-ethical imperative not only that there should be a future but that the people in it deserve a decent world in which to live. This, Robinson says, is closely tied to his career as a science fiction author, which he imagines as speaking both from and for the future. Returning again to the BLDGBLOG interview:

> *And you try to speak for them [the people of the future] by envisioning scenarios that show them either doing things better or doing things worse—but you're also alerting the generations alive right now that these people have a voice in history.[4]*

Of course, no one said this would be easy. Robinson's Utopia is never some perfect, static end-state, but rather an ongoing praxis which may sometimes achieve victories but is never victorious. We might think of the lesson he sneaks in near the end of The Years of Rice and Salt, when he reminds us that while our individual lives and personal struggles must necessarily end in the tragedy of death, we can still find the possibility of comedy, of happy endings, in the long arc of history towards justice and collective life.[5] In Pacific Edge he's a bit more blunt about all this; he defines Utopia with two simple, brutal words: "Struggle forever."[6]

So we struggle. And in Robinson's novels it is science that lights the path. But like his relationship with Utopia Robinson's relationship with science is neither uncomplicated nor naïve. He is aware of the pitfalls. He knows about Frankenstein and he's heard about the atom bomb. In his most recent novel, Galileo's Dream—a novel that plucks Galileo from the 17th century to the moons of Jupiter 500 years from now—Robinson describes the history of science and its sometimes-cooptation by capital and the state this way:

> *Science began as a Poor Clare. Science was broke and so it got bought. Science was scared and so did what it was told. It designed the gun and gave the gun to power, and power then held the gun to science's head and told it to make some more. How smart was that? Now science is in the position of having to invent a secret disabler of guns, and then start the whole process over. It's not clear it can work. Because all scientists are Galileos, poor, scared, gun to our head. Power lies elsewhere. If we can shift that power… that's the if. If we can shift history into a new channel, and avoid the nightmare centuries. If we can keep the promise of science, a promise hard to keep.[7]*

Polygraph *spoke to Kim Stanley Robinson in the spring of 2009.*

I. Science

Polygraph.

One of the more salient features of your work has been the union of serious science with serious politics. Both the Mars trilogy and the Science in the Capital trilogy focus on scientists who decide they must involve themselves directly in the politics of their time. In Science in the Capital this comes through not only in the critique of capitalism's dangerous ecological practices but also in the way the practice of science is continually stalled both by the privatization of intellectual property and by the partisan political process. How might scientists be, or become, politicized? Is this what science fiction is for?

Kim Stanley Robinson.

This is a hard question. Scientists, I think, would resist the idea that they need to become politicized, as they often think in ways that would make science and politics a dichotomy, with science being clean, pure, rational, empirical, etc., and politics being the opposite, and bad. So it has taken the global climate crisis to wake them up as a community to the need that exists for them to join the political process specifically as scientists, and as the scientific community. I think the story of this first decade of the twenty-first century is them seeing and understanding that need, partly because of the anti-science actions of the Bush administration, and partly because of the danger they see in the coming climate change and the inability of the normal political process to react adequately to this crisis.

What they have done, then, is in keeping with their image of science and how it works; they have begun their political action through already existing channels, meaning the professional associations they all belong to, like the American Chemical Society or the American Association for the Advancement of Science, (there are scores of these), and also through scientist advocacy groups like the Union of Concerned Scientists. These organizations have been charged by their members to speak to the political powers-that-be in terms strong enough to make an impression on political actions taken; that the carbon we are putting in the atmosphere and ocean, and the environmental damage we are creating more generally, are dangerous to the current biosphere; dangerous enough that it is right to speak of a possible "mass extinction event" like those found in the fossil record, in which really significant percentages of the species on Earth went extinct. That can happen again, and humanity would be fully entangled and ruined in such a crash—while maybe not rendered extinct, but in danger of huge losses of life and quality of life.

This message has been put out to the human community by the scientific community, with an insistence and urgency never seen from scientists before—which is one sign among many others of the reality of the danger, as most scientists would very much rather pursue their science than do this kind of work. But it has to be done, they have judged, and they have taken the first steps. The work of the Intergovernmental Panel on Climate Change is only the largest of these efforts. Some statements on this issue have been signed by as many as 130 international scientific organizations.

What comes next is of course very interesting—because capitalism doesn't want to hear them. We are somewhat past the high point of the recent "free market" ascendancy because of the financial crash, but the underlying power of capitalism is not yet much diminished, and exterior constraints on capitalist growth are still so unwelcome that they are usually denied as real constraints. So we are

entering a zone of history where the struggle between science and capitalism for dominance of our culture—which I think has been clear all along, but which many do not see or agree is the situation—may become explicit and open. I hope so; this is a scientific culture as well as a capitalist culture, and I've been arguing for years that the utopian ethics and politics buried in the scientific method makes science the equivalent of the most powerful leftist politics we have ever had. Now the climate crisis may make that much more obvious to everyone.

As for science fiction, who knows what it is *for*. To me it is simply the literary realism of our time; in other words, if you want to write novels that reflect the time we live in in accurate and stimulating ways, you will end up writing science fiction because that's the culture we live in. It's also a good tool to sharpen up one's thinking about the future. It could be good for making scientists think a bit more about what they are up to and how science works and fits with the rest of culture, but this assumes that scientists read science fiction, or fiction, and I find this is not often true. Many scientists report to me that they read science fiction when they were young, found it inspiring, then gave it up later—they don't say because it was too unrealistic, but often they imply that. But they often have given up on reading any fiction at all, so there may be something else going on there; it's hard to say. The idea of science fiction educating scientists also assumes that the science fiction is good enough to say something new and interesting to scientists about science. That's also a big assumption.

PG.

You cite a fundamental struggle between science and capitalism as defining our cultural moment, but is this opposition really so stark? Many critics of capitalism have argued for their functional inseparability, including such otherwise opposed perspectives as Foucauldian analysis of power-knowledge and the Frankfurt School critique of the Enlightenment legacy. Many (if not most) scientific institutions, from the British Royal Society to contemporary corporate universities and think tanks, have received their legitimacy, funding, and even agenda from the dominant powers of their respective societies, whether monarchical or capitalist—and this of course includes the science of ecology, the intellectual basis of the environmental movement. If we can distinguish a scientific ideology distinct from its capitalist context, might it be one that hasn't yet been formulated? To put it another way: how do we liberate science from capital?

KSR.

I do see the opposition as stark. For me, it is Manichean and a way of sorting out the information of the world: I see it as Science vs. Capitalism. I think there is a historical basis and theoretical framework to support this view.

The critics you mention (Foucault and the Frankfurt School) were formidable theorists, but the most recent and sophisticated findings at this interface come out of science studies. You need to include in the discussion Bruno Latour, also Isabelle Stengers and Donna Haraway, and Bachelard, Bourdieu, Shapin, Biagioli, really that whole community that, since Kuhn, has been trying to study science as one human system among others. Their work has opened up and deepened the description of what is going on in science, both in the past and in our moment.

Then also it would be very good, important, to read scientists, talk to scientists, study the field in its own documentation and practice. What working scientists have to say about science is often more illuminating than what theorists say about it from the outside—no surprise—and really it's best to read

both insiders and outsiders to get a full picture. Among the scientists you should read E.O. Wilson, Stephen Jay Gould, António Damásio, Sarah Hardy, Roger Penrose, Steven Rose, Michael Gazzaniga, Richard Feynman, Jared Diamond, Steven Weinberg, Patricia Churchland, Paul Davies, Lee Smolin, George Lakoff, John Barrow, and on it could go—it's a rich literature from a thoughtful community of practitioners.

What all this might help make clearer is that, within capitalist society, science has struggled from its beginning as an alterity, an already existing utopian community, because its distinctive power in the real world has managed to create a counterhegemony to capitalism itself. Science is a praxis—it's what theory or the humanities always call for, sometimes as if it is entirely absent. But it's already being enacted, in inevitably compromised ways, because of the overarching structure of capitalism within which science has always moved. Science has always had to seek funding, and capitalism has always tried to buy science and to own the results of science—to aim science's creation of ability and capital in certain easily owned directions, and to own that capital. So we see the giant struggle of what are almost conjoined twins, as if in some Hindu cosmic drama.

Why is this ideology, the scientific method, so different, and so powerful in its real world effects? I think it has to do with some kind of "ping factor" (as in sonar): its constant efforts to test its assertions against perceived reality—or the non-human, or what have you—in order to see whether the assertions actually hold up to tests of various kinds. The move to quantification came from an effort to ask questions that were amenable to this kind of test. But the method can range beyond the quantifiable, and often does. There is a utopian underpinning to these underlying questions of value that science attempts to answer along with the more obviously physical and quantifiable questions. Who are we? What might make us happy? Does this or that method work in making us healthier? These too have become scientific questions, with distinctive answers born of science's desire to create testable assertions and tweak them in repeated reiterations and revisions.

They're not the same answers created by capitalism to these same questions, where desires and habits are encouraged that lead to profits for a certain portion of society, but deteriorating health and happiness for most people, and for the biosphere.

So, it's not that scientific ideology has not been formulated; it has (although as a community it tends to be inarticulate about its goals). But it's also a work in progress, continually applied and then studied and tried again, for a few centuries now, studying not just the results but the method itself, and getting better—after being shocked and humbled by some huge reverses, moments of hubris after which the idea that science had been perfected as a method was shown to be wrong and corrections were then proposed and attempted. That process continues, but always under enormous pressure to "be more profitable," which certainly distorts its efforts. It is a clash of paradigms and systems of power.

How do we liberate science from capital? We believe what science tells us, as our strongest method and ideology, instead of believing advertising and the consumption habits of our culture and our time. That in itself would make a huge difference. It might move us to support democratically a government that became increasingly scientific, and the utopian project would then proceed on a collective basis. Science would be aimed at different goals and technologies than it is now, and the public would own the resulting capital, with life's necessities all conceptualized and legalized as "public utilities" and private capital finding its power reduced to something like a kind of superstructural efflorescence, a playground for the space beyond the necessities. If that change could be made

nonviolently it would be an amazing accomplishment, and yet because of the existence of democratic governments and the supposed rule of law, it is theoretically possible. But it takes a different view of science than the one your questions imply, and that one sees expressed pretty frequently in left and progressive circles. What if science and democratic government are both leftist praxis itself, both "already existing leftism," struggling with capitalism as best they can? I think it helps to think of them this way, and I think the evidence is there to support the notion.

All these paragraphs are hypotheses that need to be tested, or turned into novels, obviously.

PG.

Late in Sixty Days *and Counting one of your characters remarks "Maybe we can't afford to fight capital anymore," suggesting that the seriousness of the environmental crisis demands that all political effort be marshaled towards its resolution, or at least its reduction. Do you see this as a temporary truce or a more permanent détente? Given the critiques of capitalism elsewhere in your work—including earlier in the Science in the Capital trilogy itself—does this represent a shift in your thinking about the prospect for radical political change? To put it another way, how can we be sure that a "truce" with capitalism is different from a surrender to it?*

KSR.

Well, this was a Phil Chase statement, and he is a character prone to provoking his friends and colleagues by overstating things. He argues that if we have to reform capitalism and save the environment at the same time, we have too much on our plate—that the climate crisis demands immediate action, whereas getting beyond capitalism looks to be a long-term project at best—so he suggests that we configure the legal/economic landscape such that we can aim capitalism like a tool or weapon at the immediate problem at hand, which is swapping out the energy and transport systems very quickly, among other important changes.

This might be good to try, but other characters and events in that novel make it clear, I hope, that because capitalism itself is a big part of the climate problem, really we need to attack the problem of capitalism's detachment from reality if we are to have any hope of stabilizing the climate and our relationship to the biosphere more generally. Not to mention justice among humans, which is a question with an environmental impact too.

This would involve inventing a new economics that would be more scientific, more like an ecology of the biosphere in which our actions were included. It's a commonplace that economics is not a science—that it is more like a system of analyses of human laws, laws usually taken as given or immutably natural, even though they are hierarchical and could be changed by legislation. So it's a power-support mechanism pretending to be a science, like astrology in the Middle Ages. But it easily could become a science if all the capitalist laws were also put on the table and studied as processes with real-world results, and the results judged against some kind of scientific rubric of well-being—this gets tricky, but you see scientists groping toward concepts like biodiversity, ecological balance, and the like, even naïve postulates like the editorial by Wallace Broecker in Science which suggests that we create a "carbon pie" that all humans have an equal share in: an end of property, in other words, but not put that way.

I've been trying to use standard economic terms to describe the situation in ways capitalists might have to come to terms with and that might serve as entry-points to a larger discussion: that the implicit promise of capitalism was that a generation would work so hard in the working class that its children would be in the middle class, and that if extended this program would eventually lift everyone on Earth., But now resource analysis makes it clear that for the three billion living on less than two dollars a day this promise can never be fulfilled, so that capitalism is really nothing but a big Ponzi scheme, and would be illegal if run in a single state or community.

The pricing we put on things, carbon especially, does not include the environmental costs of making the thing, so that we are practicing systemic predatory dumping, and the competitors we are predating on are our own children and the generations to come. So we are predatory dumpers, out-competing non-existent people, which is easy enough, but they will suffer when they come into existence, and we are cheaters.

So these are different ways of saying that capitalism is a system of lies, but I hope they open the discussion again, because I don't think capitalism can be defended from these criticisms using its own vocabulary.

Another way is to say that science is an ideology (using the Althusser definition of "an imaginary relationship to a real situation")—admitting that, and then exploring what it means—that among others it might be the most powerful and effective ideology, if judged against the performance of all the other ideologies.

II. Justice

PG.

Taking your point about science, what about democracy? Are you referring to any currently existing model of leftist praxis, or are you suggesting some potential capacity, a subsequent direction for political effort?

KSR.

Both of those, but mainly I am referring to the ones operating now around the planet, acknowledging that they work under great pressure and are deformed from their best or ideal selves. But it's the combination of the actual democracies and the idea of how they could work if they were running the way they are supposed to that I take to be the potential state, something like Lincoln's great formulation "of the people, by the people, for the people." This potentiality is a site of contestation and therefore something we have to regard as an improvable reality, and stay engaged in making the potential good more enacted, bit by bit. If democracy is enacted and a majority of the electorate wants to do good things—which majority should be possible to gather, or else just how good are we as educators and persuaders, and how good is our cause?—then good things could follow. This is where science comes in, as the ultimate educational system and persuasive method, also as a method for helping decide what causes are good. People don't always see that moral imperative or navigation system within science, and that's where science fiction comes in, to explore that somewhat hidden dimension.

PG.

The history of American democracy, for example, is only sporadically encouraging as a form of governmental praxis in opposition to capitalist imperatives.

KSR.

I'm not so sure of that. Maybe it's done the best it could against a truly powerful system—I wonder about that when I look at alternative forms of resistance to capitalism and how well they have done. The social democracies of northern Europe might be models of the next steps toward even better democracies. There you get into science fictions again, the utopian or optopian[8] mix of present and future.

PG.

And hasn't it been by resisting American democracy that most of the rest of the world manages to retain political and economic agency?

KSR.

It's true, the American electorate has elected representatives who have then acted as if they were a capitalist imperial power, causing huge and unforgivable damage all over the world. And a majority of the American public has either approved this imperialism or managed to stay ignorant of it. Mark Twain and John Dos Passos are as clear as anyone in describing how this happened in the Manifest Destiny period. Voters vote emotionally, they act politically out of a core set of beliefs or a framing narrative, which allows them often to vote and act against their own best interests, as well as against everyone else's. Who persuades us to do that? And why are we so persuadable?

Here again theory must come in, and science, and fiction too—as analysis and education, and also scenario building, and the vision of something to work toward. The better our pedagogy and rhetoric, the faster word spreads. The better we articulate justice as a necessary component of any sustainable civilization, the sooner the notion will be incorporated into law and technology.

PG.

Even the apparent recent success of Obama's election, for all its successes in generating a mass movement, was as much a marketing victory as it was a democratic one—and the ongoing transfer of wealth from public to private funds since the election in the effort to prop up an obviously corrupt and internationally destructive financial sector isn't especially encouraging either. How can partisan politics and an increasingly middle-class voting bloc dependent on consumer credit and cheap labor ever be expected to act in advance of sheer necessity?

KSR.

I'm wondering if this is the moment of the awareness of that sheer necessity, or the beginning of it, so that possibilities for real change open up in the years to come. We have to act on the basis that this may be true, because the need to decarbonize our civilization fast is such an overriding imperative that it trumps capitalism in the realm of human decisions and history making. So changes will come, and I'm sure they will be in the context of a mixed economy, best described by Marx and Keynes, in that globalization as practiced now is a Keynesian mix of government and business, an uneasy mix that fluctuates back and forth in a power relation, and now with the climate crisis is going to turn toward

more government control of the economy and less free market business-as-usual. The push for that will come from people themselves as they come to understand the danger to their homes, livelihoods, and children, and in democracies it will be enacted by legislation; in the command economies (mainly China) it will come about from national self-interest, directed by the expert advisors going off like fire alarms while the command nations' biospheres die and their people suffer. These expert advisors to oligarchs everywhere will *be* scientists, and the scientists will be scientists by being part of an international scientific community, a community working with the same methods and paradigm, so that it works as a global coherent human effort—an effort to understand the situation better and figure out things to make or do that will better the situation.

PG.

Reading the Science in the Capital trilogy in the context of the 2008 election, the similarities between Phil Chase and Barack Obama seem difficult to ignore. Was something like the Chase or Obama campaigns inevitable after the Bush presidency? What are your expectations for Obama with regard to the environment? Will he (and can he) do "enough," given the scope and seriousness of the crisis?

KSR.

I am glad to hear someone mentioning these similarities. I wrote those books before Obama himself even began to run for office, so my novel exists as a utopian wish from out of the darkest of the Bush years. I'm sure it was a wish shared by many. Still, someone like Obama or my fictional Chase (who resembles McCain with Obamalike values, or perhaps a mutating set of values that shifts leftward as he works in office) was not at all inevitable after Bush. Indeed it's all too possible to imagine Obama losing, or some other candidate winning who did not link the economy to the environment as much as Obama seems to be doing. These years we are in now have no inevitability at all in them, it seems to me; it's a really volatile time, a true crisis.

So, I don't know what I expect. So far signs out of the Obama administration, just beginning really, are pretty positive. It seems they understand that a "green economy" could get us out of a recession/depression, and cut our carbon burn, all at once, and this is one of the double-goods or positive feedback loops we must seize and act on. Another is social justice and population stabilization; the correlation between countries where women and children have full human rights, and reproduction rates at the replacement rate or below, are very strong, enough to constitute evidence something real is going on there, and this linkage is a very important part of any potential environmental health. It also serves as a way to bridge the feminist community and the leftist community to the environmental community; I hate it that there is any gap to be bridged here, as I see them all as parts of a whole, but historically we see a certain disconnect, gap, even antagonism, as if each has been saying, "my crisis is more important than yours!" As if they were not always the same crisis, and all of them anticapitalist. So, when I see signs of this kind of understanding from the administration, it seems to announce a more general cultural understanding, and I am encouraged that we will be doing good things.

Can Obama do "enough"? I hope so. I tend to go with his judgment, when he says that he is an expression of what we all want, so if we want to deal with the crisis, we can. Will we? This is an open question. There are some very serious obstructions. Or to put it more clearly, there will be many very capable, serious, and well-funded people doing everything they can to impede, forestall, and reverse any progress we might make. Many of these people are stuffed with anger and resentment—why I am not so sure, maybe just because the world is not turning out the way they wanted it—but whatever the

cause, they are intensely motivated to do bad. That this is true is a shame, but it is true. A science fiction that could convince even these people of the value of government in creating a sustainable civilization, and of the reality of the crisis moment we are in now in our relationship to the biosphere, would be a really powerful science fiction…

PG.

Doesn't the antagonism you describe between environmentalism and the left also manifest within the environmental movement itself? We might refer to various factions, all of which assume a broadly "green" orientation: the official conservationism of organizations like the Environmental Protection Agency or the Sierra Club, the environmental justice movement, green consumerism, deep ecology or biocentrism, Evangelical environmentalism, and so on. Can we really say the "Green Recovery" or "Green New Deal" proposed by some policy makers belongs to a coherent "environmental community" of shared assumptions?

KSR.

Well, maybe. Look underneath the various platforms of the groups you have mentioned (not easy to get underneath Deep Ecology of course, it being so deep) and see if there's anything in common, anything simple but basic to all, like "Earth's biosphere matters" or something like that. Some of these groups will fail the test and be revealed as "greenwashers" who are claiming to be green and are instead front groups established by capitalists to muddy the waters and help them keep their hold on the system, or at least escape to their island getaways where they imagine they will be safe (they won't). But most of these groups are working on the underlying notion that the Earth matters, and are dealing with it from their own perspective and in the best way they can figure out to do. The front is broad, so in theory they should all work together. Indeed in coming together, ideas from Deep Ecology are very important too.

In practice we see a bit of back-biting and the like, but it's less harmful than in some social movements. All these people focused on conflicts within a movement need to think about Freud's "narcissism of small differences." Sometimes real and important distinctions are being fought over, but too often the insistence that these differences trump all else is the result of the narcissism of small differences. I read an account of the recent election victory of a leftist in El Salvador, that those celebrating were chanting, "the Left, united, will never be defeated." A nice thought, and maybe this election was a data point supporting the assertion, but how often has the assertion been tested? In other words, how often has the Left been united? We need more experiments to try this assertion out and see if it is true! The left united will never be defeated… Hmm, interesting hypothesis. Deserves further testing.

PG.

In a culture that remains so beholden to mass media, how does partisan politics move past the level of the sloganeered sound-bite and the meme towards useful political interventions, especially when huge percentages of national populations still deny basic scientific theories like the theory of evolution (much less climate change)?

KSR.

There's lots of educating left to do, that's for sure! So, start talking and writing. A real examination of rhetoric—a scientific examination of how people are persuaded of new ideas—this too would be good, to consciously improve our tools and methods.

You may scoff at the idea of scientifically examining persuasiveness, but scientists do it all the time, and their results are very suggestive. We should be learning from them, and Lakoff 's work on framing narratives is a good start in that direction.

It's instructive also to remember the story of how the carbon industry researched the possibility of swaying public opinion, to confuse people about how unified the scientific community was concerning the reality of climate change and resulting biosphere damage. As related by Naomi Oreskes, they studied what the tobacco industry had done when hoping to achieve similar confusion, and then they spent half a million dollars to perform experiments in a number of American cities, taking polls before and after various kinds of advertising and publicity campaigns, several based on the tobacco industry's experience. As Oreskes noted, "they behaved more scientifically than the scientists" by running and evaluating experiments and then acting on the basis of the results, to good effect for their cause. The left should be using and engaging science in the same way. Why not? Science is not the enemy but the battlefield.

The left has not acted as if science were a tool, a method, and as such, an already-existing fellow traveler or even ally, or even a model for action, and a process the Left should join, use, follow, enlarge, and illuminate. Science would love to hear itself theorized, if the lessons learned from that process gave rise to interesting new experiments, which could eventually lead to improvements of scientific method. One of science's strengths is a planned adaptability. It is possible consciously to change science, it's been done many times before and it's always happening.

One concept I've been using with I hope some success is E.O. Wilson's word *consilience*. He uses it mostly to ask for a greater mutual comprehension between the sciences and humanities, and that would be a good thing, but I use the word to remind people that there already is active consilience between all the sciences—that they work from a shared over-arching paradigm that is similar to physics' "standard model," such that physics supports chemistry which supports biology. This allows one to point out the cherry-picking or sheer intellectual incoherence of people who go to the doctor when they are sick and yet profess not to believe in evolution. Everyone trusts physics and biology as sciences when they get on a plane or go to the doctor, and when you point this out, if it is accepted it leads to more openness to the idea that there is further consilience—that sociology, anthropology, psychology and the rest of the human sciences are also consilient with biology, chemistry, and physics, and, though the questions get harder, the methods are the same and the answers, when achieved, are part of a whole system. That agreed to, we come to economics and the questions of "what are we" and "what should we do" begin to fall under the umbrella of consilience and it may be we can get answers most of us would agree to, because they are integrated successfully into the larger field of human knowledge. In such a manner politics becomes scientific.

This is at least a talking point or a way into the discussion of how we decide what is right action.

PG.

How, in your view, can democracy be put to work in service of social and environmental justice and responsible governance?

KSR.

This must be a whole program with reforms all across the board. Complex and messy, it would (or will) take many years in many jerks and starts. But it would begin with electing representatives who have promised to work on it, and then holding them to it in subsequent elections, for a long time, until a pattern was built and a certain trajectory or path dependency set into place. A very difficult assignment. It's part of the education and persuasion project sketched above.

PG.

These questions about government take on new urgency when we return to the problem of a calculated, coordinated response to immediate environmental threats like climate change and ocean acidification both within and across nations. Even putting radical measures like geo-engineering aside for a moment, the need to carefully manage human interaction with the environment would seem to put an end to the anarcho-communist, anti-statist tendencies that have been so common on the Left since at least the fall of the Soviet Union. Are we finding more and more that we need the state, whether we like it or not, at least in the short term? Don't the breadth and depth of our ecological crises call, if not quite for a return to Leninism, to a renewed trust in centralized authority that has come to seem quite alien, and, perhaps, even impossible?

KSR.

Yes. But let's go back to the Lincoln formulation. The state = us. So the statement "we need the state" reduces to "we need us." Yes we do. I guess it means, "we need us to do the right things as a collective or a civilization." If we don't objectify the methods (the state) into something physical, like a fortress, maybe it will be easier to imagine it happening. Methods change.

Maybe the new thing here is that it used to be that we on the Left were always interpreted as saying "we should do good things," and everyone would agree but then continue doing bad things, as being the way of the world and the only practical way to get along. Now, in the climate crisis, we are saying, "we need to do good things or we won't survive—and we can make that case scientifically." Justice becomes a survival technology. Of course it's a little galling to treat justice as something that needs a more utilitarian reason to support it, but since as a good idea it has only gotten us so far—to an amount of justice more than none but not enough—we might as well take advantage of this extra notion of justice as survival, because it's true, whether we point it out or not. Justice stabilizes population growth, and reduces the discrepancies between rich and poor, which extremes are both very environmentally destructive among their other bad qualities. Real justice would alleviate the poverty that has desperate people stripping away forests and soil in much of the world, and it would reduce the hyper-consumption of the rich, which is equally or even more destructive of resources and excessive in carbon burn. The only possible road to sustainability's necessary carbon neutrality involves justice. We should insist on this at every opportunity. It points to a justice that is more than just a meaningless right to vote, but something far larger, something like a decent human existence for all.

III. Science Fiction

PG.

This discussion brings to mind the variety of science fictions currently circulating in popular culture. Whatever their basis in fact, a few have fairly clear ideological implications. The posthuman visions of the Singularity, like those articulated by Ray Kurzweil, collectively serve as science's promise of a future elect emerging out of catastrophe. The "new secularism" of figures like Daniel Dennett and Richard Dawkins use science as an authority to bludgeon the religious. And the excitement over green technology seems to gravitate toward imaginary solutions that will erase the need for changes in lifestyle, i.e. "clean coal," climate-stabilizing geoengineering projects, or proposed nuclear-centric power grids. Given that a good portion of what is marketed as science fiction relies on semi-magical technologies that ignore unsexy ecological costs, how does science fiction as the inheritor of realism tell itself apart from science fantasy? Do you accept the "hard SF" label that sometimes gets applied to your work, or do you see yourself as doing something different?

KSR.

These are very different phenomena being lumped together, and I have different responses to each. "The Singularity" is a science fiction idea that misunderstands the human brain and our technological capacities, including and especially self-reproducing robots and "artificial intelligence." There are lots of bad and/or impossible science fiction ideas, like faster-than-light travel (which would be also time travel), but some are picked up and promoted in the real world as futurisms by interested parties who are boosters for their particular field. Nanotechnology was similar twenty years ago. There are nanotechnologies now, it's really a kind of chemistry, and there are extremely powerful computers, but neither will lead inevitably to the magic states described by the boosters. So, the Singularity is "the rapture for geeks" as Ken MacLeod so pithily said, but also a bit of boosterism. That will become clearer over time when it continues not to happen.

The scientist atheists like Dawkins and Dennett are merely insisting that supernatural explanations are not necessary to explain the universe we see; I'm not sure that's right, when you get before the Big Bang etc., but usually they are saying that the ancient religions are not good models for understanding the universe or guiding human action. So we ought to go with our more empirical (scientific) ideology, which after all has the universe a pretty miraculous space, 13.75 billion years old and full of mysteries and surprises. My sense is most scientists will stop short of atheism as being just another assertion, and stick to agnosticism, and hope only for a working method in this life (and in that, in some senses, they are acting like some Buddhisms).

Clean coal is indeed probably a neat idea that won't work. I follow James Hansen here; we should leave all the coal alone (he says, burn the oil, there's not enough left to matter, but the coal will cook us). But we should pay for work to study how to capture carbon from existing coal plants, etc. Just don't count on it helping any time soon. Which means of course that we have a huge problem, because the electricity keeping us all alive is generated to a too-large degree by burning coal. Interested parties, the carbon lobby, will fight action on this front, but we have to prevail, and fast. Alternative clean energy sources are a necessity now, not an option.

Climate stabilization by way of geoengineering I have studied, and nothing proposed seems stable, sure to be effective, and clear of unintended side effects. And the world community will never

agree to anyone trying anything in particular. And we can't just reduce the temperature by some geo-engineering means and then keep pumping CO2 into the atmosphere, because half of the CO2 that goes in the air is later taken up by the oceans, and the resulting ocean acidification is a bad problem in itself and nothing at all to be done about it. So we have to stop burning carbon, because none of the geo-engineering ideas are any good even as imaginary solutions, meaning on their own terms. In essence, stopping burning carbon IS the geo-engineering required; any replacement for that plan is even huger in impacts and difficulties.

The most powerful geoengineering technology for reducing our carbon burn would be a rapid shift to social justice and an end to capitalism. Justice, capitalism, these too are technologies—system designs, softwares. We ought always to bring this up whenever climate and technology are brought up. Demographic figures and many very strong studies have made this correlation, of justice and climate/population/ consumption relief, more than just an assertion or a virtuous thought. Democracy and human rights are effective technologies as well as forms of justice already good in themselves.

I'd like to see a complete analysis of the various "clean nuclear" options that have been proposed. I suspect they don't actually turn out very carbon negative, but I'm not sure, I haven't seen good studies (I would guess they might be out there though). We need to seriously consider *any* carbon neutral or negative proposals to bridge us to a truly clean sustainable technology. Nuclear power may be one of these. One more generation of nuclear wouldn't kill us, but the question is, would it help? Our need for energy is real, our population is real. Both can be altered, but not ignored as realities. So I say, judge each technology or proposal on its (scientific/human) merits, without preconceived ideas that "this would be bad" or "this would be good." Especially in a moment where there are few great options. Risk assessment is not an instinctive ability we have but a kind of mathematical skill that needs to be taught—another technology, in effect. We all need to learn to be better at risk assessment, which inevitably leads to cost/benefit analyses, not in economic terms but in life and species survival terms. Possibly the risks and costs of nuclear are worth taking because of the carbon gains; one more generation of new waste-burning nuclear might be a bridge technology we choose, bridging us to something better.

As for science fiction, well it's a big genre. It might be that most of it is science fantasy, including the greater part of what was called "hard SF." I think my Mars novels killed that category, because it was never talking about the amount of physics or high tech in the story, but was labeling a SF "hard" in its attitudes towards weaker people, in other words as Social Darwinist right-wing space fiction. You could just call those texts that from now on, but since no one uses the term "hard SF" much anymore anyway, it isn't necessary.

There *are* science fiction texts that form a kind of projective realism, but rather than calling them "hard SF," a better term for them would be simply science fiction itself. There's a lot of it out there mixed into the science fantasy, sometimes in the same writer or text, and it's often very good—it's up there with the rest of the best literature of our time, and maybe it is *the* literature of our time, as our time is so amazingly science fictional. It's real, very real, but also fantastical and surreal. Science fiction can capture that structure of feeling better than the older genres, maybe, as being an attempt to express our moment as artfully as possible.

PG.

William Gibson has been widely quoted in the last few years as arguing that the future is no longer imaginable, and both he and you (among others) wrote books during the Bush years that were set in the very near future, if not indeed a thinly disguised present. During these same period, the "Mundane SF" movement as advocated by people like Julian Todd and Geoff Ryman has risen to prominence in calling for an end to fantasies about warp drive, aliens, and fantastic technology-fueled abundance, and instead demanding stories premised by the notion that "the most likely future is one in which we only have ourselves and this planet." Has it, as Fredric Jameson has written, become impossible to imagine a future that is neither radically apocalyptic nor a mere attenuation of the present? Has our sense of the future become foreshortened, and if so what does that mean both for science fiction and for Utopia? If not, where does the blueprint for other sorts of futures begin?

KSR.

We can still imagine all of it.

There is a flourishing science fiction going on that is devoted to the near future, as always in the history of science fiction, and because more and more our daily reality and our recent history resembles science fiction, it becomes more true that the genre formerly known as near future science fiction is now simply realism itself, and as such the best description of the felt reality of our daily lives. Thus we have Gibson, Ryman and the "mundanes," and many other writers working explicitly in this genre, to great effect.

But at the same time there is a flourishing "new space opera" coming mostly out of the U.K. (indeed most good SF of all kinds comes out of the U.K. these days) and there is no reason to doubt that if you choose to locate a story about a thousand years or more out from now and populate it with humans, then the postulate is that we have survived, and are very likely by then to be a quite spectacularly powerful species, both outwardly into the solar system and maybe the stars, and inwardly into our own genome and minds. Almost anything might happen—and this is simply a great zone for new stories. Not only is it expressive of our deepest fantasies and desires, but it might even come true—what a mix! So, there is no reason not to love far future science fiction as well as near future science fiction.

In the middle, and a bit depopulated as a subgenre of its own, is that range of history that is about a century or two out from now. Somehow it seems certain these will be fraught and dangerous centuries. They will constitute a crisis zone, a peninsula of perpetual tipping points, along which we must successfully balance and navigate if we are not to fall into some kind of depressing apocalypse and after-the-fall scenario (which science fiction has also supplied in abundance, of course).

There is no very plausible history running from the near futures we depict to the space operas we write. Showing those bridge centuries is therefore almost necessarily utopian, in that any proposed society suggests a possible way forward, thus a kind of success story for history, at least up to that point; while the dystopian and apocalyptic scenarios are also utopian, in that they are warnings saying "don't go this way" with the implicit suggestion there must be better ways (at least usually—some writers seem to think there are no good ways left).

So, utopias have never been thick on the ground, partly because they take place in this difficult middle zone, the history most certainly before us, which takes on big shadowy portended shapes, but is well beyond what we can clearly foresee. It's just a mass of potentialities not yet narrowed by contingency and passing time. I am interested in this zone, but as a story space it is vexing and in the end impossible, so that it becomes perhaps mostly a way of talking about now, an estrangement, or projection of current hopes, or something like that: scenario building, derangement, a casting forward of the imagination. ■

1 Kim Stanley Robinson, *The Wild Shore* (New York: Orb Books, 1995), 198.
2 Kim Stanley Robinsom, *Pacific Edge* (New York: Orb Books, 1995),
3. 3 BLDGBLOG, "Comparative Planetology: An Interview with Kim Stanley Robinson," http://bldgblog.blogspot.com/2007/12/comparative-planetology-interview-with.html.
4 Ibid.
5 "Perhaps the way to construct a proper history is to inscribe the whole figure, and say that for the individual, ultimately, it is a tragedy; for the society, comedy. If we can make it so." Kim Stanley Robinson, *The Years of Rice and Salt* (New York: Spectra Books, 2003), 737.
6 Robinson, *Pacific Edge*, 95.
7 Kim Stanley Robinson, Galileo's Dream (New York: Spectra Books, 2009), 524–525.
8 *Optopia*, borrowed from Joanna Russ, suggests not a *perfect* society but the *optimum* society, the best one possible given our starting conditions. See Bud Foote, "A Conversation with Kim Stanley Robinson," Science Fiction Studies 21, no. 1 (1994), 59.