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ARTICLE

What is Cli-Fi?

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Abstract

This essay begins by reviewing the theoretical debates within literary-critical "ecocriticism" over what Paul J. Crutzen and Eugene Stoermer termed the "anthropocene" and what Jason Moore terms the "capitalocene." It explains how those debates are implicated in recent climate fiction, which Daniel Bloom dubs "cli-fi." These debates have direct implications for the possibilities and prospects for environmental education, insofar as both "high" literature and "popular" fiction remain important objects of educational practice. The essay proceeds to a critical account of the climate fictions of the Californian science fiction writer Kim Stanley Robinson, arguably the leading contemporary Anglophone cli-fi writer, whose work regularly features in environmental education programmes.

Keywords: climate change; literature; sociology

According to Brian Merchant, Daniel Bloom coined the term "cli-fi" to denote climate fiction in 2007 (Merchant, 2013). Cli-fi comprises both "high" literature and "popular" fiction, both of which remain important objects of educational practice, and thus have a direct bearing on the possibilities and prospects for environmental education. Bloom, Merchant and others have prosecuted the case for cli-fi to be considered a new literary genre, a claim that should not be accepted without serious theoretical scrutiny. Genre is an aspect of the more general phenomenon of cultural "form," traditionally subject to distinctly "formalist" modes of analysis preoccupied with systems of formal classification. But, as John Rieder made clear in an article specifically addressed to science fiction (SF), recent cultural criticism has tended towards a "newer paradigm" that "considers generic organisations and structures to be … messily bound to time and place" (Rieder, 2010, 193). Rieder draws a sharp distinction between "the pre-existing classical and academic genre system" and the emergence during the nineteenth century of "a genre system associated with mass publication." The two genre systems, the classical-academic and "the mass cultural genre system" are, in Rieder's view, distinct from and in tension with each other (Rieder, 2010, 199; Rieder, 2017).

Like Rieder's, my approach is historical rather than formalist in character, but I would go further in stressing the necessarily social character of form as a kind of "force of production," a mechanism for enabling and facilitating cultural communication. As Raymond Williams put it, form is not a matter of classification, but of social relationship, "a social process which … becomes a social product. Forms are … the common property … of writers and audiences or readers, before any communicative composition can occur" (Williams, 1977, 187–188). Whilst I have no doubt that a new system of genre classification did indeed emerge in the nineteenth

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century, I would nonetheless wish to argue that it functions at a different level of analysis from the classical system and that the two are not thereby necessarily in conflict. Here again, I resort to Williams, who distinguished three different "levels of form" denoted as, respectively, "modes," "genres" and "types." He reserved the term "mode" for the deepest level of form, which persists through quite different social orders: "they are very general, and their reproduction is at least relatively autonomous" (Williams, 1981, 194). He nominated the term "genre" for relatively persistent instances of each mode, which are "significantly more subject to variation between different epochs and different social orders" (Williams, 1981, 195). Still more variable and still more dependent on particular social relations are what Williams termed "types," that is, "radical distributions, redistributions and innovations of interest, corresponding to the specific and changed social character of an epoch" (Williams, 1981, 196). On this model SF is a "type" established in nineteenth-century Europe through a radical redistribution of interests towards science and technology mainly within the novel and short story "genres" of the narrative "mode." In the twentieth century, the same concentration of interests is redeployed into various theatrical, film, radio and television genres of the dramatic mode.

The social construction of cultural form

If form is a social construct, then the obvious question arises as to how exactly a particular type is socially constructed. Two of Williams's more general theoretical concepts, "selective tradition" and "structure of feeling," can productively be applied at this point. Williams used the term selective tradition to denote how cultural tradition entails "a continual selection and re-selection of ancestors" (Williams, 1965, 69). For Williams, this argument was directed primarily at the high literary canon, but it can clearly also be applied to what Darko Suvin calls the "SF tradition" (Suvin, 1979, 220). So, the genre initially identified as scientific romance, later as scientifiction, later still as science fiction, developed by way of a series of competitive struggles to redefine its own tradition selectively by reselecting its ancestors. These definitions and redefinitions are in no sense arbitrary; rather, they are focused and refocused around the role of science and technology in industrial and post-industrial societies. Williams's concept of structure of feeling is a way to theorise the historical formation of a structure of meanings as "a wide and general movement in thought and feeling" (Williams, 1963, 17). He was particularly insistent that the new industrial science and its technologies were a crucial element in the emergent structure of feeling of nineteenth century Britain. And this surely is the significance of Mary Shelley's *Frankenstein*, that it imagined emergent biological science as practically applicable to medical technology.

I would argue that contemporary cli-fi is a sub-genre of SF rather than a distinct and separate genre for two main reasons. First, both its texts and practitioners — writers, readers, publishers, film directors, fans, etc. — relate primarily to the SF selective tradition. Most of its key exponents, for example Kim Stanley Robinson in the USA, Jean-Marc Ligny in France, Dirk C. Fleck in Germany, James Bradley in Australia, self-identify as SF writers and are identified as such by the wider SF community. Robinson has won two Hugo Awards and two Nebula Awards for Best SF Novel, Ligny has won a series of French SF awards, including the Prix Bob Morane, the Prix Rosny Aîné, the Prix Une autre terre and the Prix Julia Verlanger, Fleck has twice won the Deutscher Science Fiction Preis, Bradley has won the Aurealis Best Novel Award in SF. Moreover, cli-fi writers inclined to refuse the generic label, such as Margaret Atwood in Canada and Jeanette Winterson in England, often do so on the grounds that their work is "literary" rather than "genre" fiction.

Second, both cli-fi's texts and its practitioners articulate a structure of feeling that accords centrality to science and technology, in this case, climate science. As Robinson says in his "Introduction" to the omnibus edition of the *Science in the Capital* trilogy: "science itself is the genius AI that we fear to create; it's already up and running. Attend to it and act on what you learn.

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It's the science fiction way" (Robinson, 2015a, xiv–xv). Neither of these conditions — those established by the selective tradition and those by the structure of feeling — are set in stone. It is possible that cli-fi will, at some time in the future, evolve into a comparatively autonomous genre, with its own selective tradition and its own structure of feeling; but this has not yet occurred.

Between the pre-history of climate fiction — from Genesis to Verne and Wells — and the contemporary sub-genre Bloom terms cli-fi, the crucial shift has been the development of a near-consensus amongst scientists about the potentially disastrous effects of climate change. Modern SF has always enjoyed a close, if sometimes fraught, relationship with science. In 1818, Mary Shelley famously insisted, in the opening line of the Preface to *Frankenstein*, that: "The event on which this fiction is founded has been supposed, by Dr Darwin ... as not of impossible occurrence" (Shelley, 1980, 13). Verne and Wells quarrelled over the scientific adequacy of each other's lunar adventures: Verne observing that "I make use of physics. He invents ... show me this metal. Let him produce it" (Verne, 1997, 101–102); Wells that "Verne never landed on the moon because he never knew of ... the possibility of sending back a message" (Wells, 1933, ix). In 1926, Hugo Gernsback's opening editorial in *Amazing Stories* described the genre as a blend of "romance intermingled with scientific fact and prophetic vision" (Gernsback, 1926, 3). In 1979, Suvin, the generally acknowledged founding father of academic SF studies, distinguished SF from fantasy on the basis precisely of its dependence on "*cognitive logic,*" by which he meant its scientificity (Suvin, 1979, 63).

There are counter-arguments, most obviously Brian Aldiss's that: "Science fiction is no more written for scientists than ghost stories are written for ghosts" (Aldiss, 1973, 1); or, more extremely, China Miéville's that SF is based on "capitalist science's bullshit about itself" (Miéville, 2009, 240). There are many different versions of the genre's vocation, almost as many, in fact, as there are of its definition, and I have no desire to privilege Suvin's and Robinson's over Miéville's or, say, Atwood's (Atwood, 2011). But it seems to me that, insofar as some SF does indeed define itself in relation to science, then that kind of SF finds itself obliged to produce fictional responses to problems generated by contemporary scientific research. As Paolo Bacigalupi, co-winner with Miéville of the 2010 Hugo Award for best SF novel, observed of his 2015 novel *The Water Knife*: "the roots of this devastated future drew sustenance from the dedicated research and reporting of ... science and environment journalists" (Bacigalupi, 2015, 371).

On this view, SF ideally functions as an adjunct to futurology. As George Turner, author of one of the earliest of contemporary cli-fi novels, argued: "*Science fiction could be a useful tool for serious consideration, on the level of the non-specialist reader, of a future rushing on us at unstoppable speed*" (Turner, 1990, 209). Moreover, insofar as SF is written in response to such genuinely scientific concerns, then it will not normally be apocalyptic in the strict sense of deriving from the *Apokalypsis*. This last book of the Christian Bible is a richly complex text, subject to multiple interpretations even amongst believers. It is clear, however, that the revelation in Books XX and XXI has the double meaning of a divinely ordered destruction of an irreparably wicked real world (XX, 11–15) and a divinely ordered establishment of a new earthly heaven (XXI, 1–8). Catastrophic SF typically reproduces none of these tropes: its catastrophes are normally either natural or man-made; its real worlds are often merely damaged rather than destroyed; and are more likely to be represented as foolish than as wicked; and, finally, there is typically no subsequent compensatory resolution akin to the idea of a heaven on earth. Those who stress the continuity between such religious and subsequent secular apocalypticisms tend thereby to downplay both the textual specifics of *Apokalypsis* and the historical novelty of modern SF as a genre defined primarily in relation to science and technology.

The last twenty years have witnessed the emergence of a substantial body of ecocritical writing on literature and climate change. But ecocriticism is in general predicated upon a version of traditional literary-critical close reading aimed at judging texts aesthetically in some updated version of Matthew Arnold's understanding of culture as the "best which has been thought and said in the world" (Arnold, 2006, 5). Literary criticism of this kind typically aims at the

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identification of some kind of literary canon. In Christian theology the term canon referred to the books of the *Bible* acknowledged by the Church as divinely inspired, and therefore true. But capitalism threatened to undermine all such institutions for the authoritative allocation of value. As Karl Marx and Frederick Engels observed in *The Communist Manifesto*: "The bourgeoisie ... has converted the physician, the lawyer, the priest, the poet, the man of science, into its paid wage-labourers" (Marx & Engels, 1967, 82). Their judgement was, however, premature. For, the nineteenth century witnessed the emergence of a cluster of European and South American nation states, which used tax revenues to sustain a series of non-market institutions, not least the military, the universities, and in the twentieth century public broadcasters. These institutions were essentially conservative, in the sense that they sustained both the newly dominant bourgeois culture and also substantial elements of residually feudal culture. And so they continued until the transition to what Fredric Jameson, following Theodor Adorno, calls late capitalism, in which "aesthetic production ... has become integrated into commodity production generally" (Jameson, 1991, 4). Ours has thus become a culture with no institutions for the authoritative allocation of aesthetic value, which therefore requires no canon.

Academic literary criticism was a product of this national institutional complex. It should be no surprise, then, that its primary subject matter was the national literary canon, simultaneously endorsed by and endorsing the imagined and imaginary community of the nation state. These national universities, churches and public broadcasters were thus institutions for the authoritative allocation of national value articulated in the dominant national language. Literary criticism's canons were thereby invariably national in character, English in England (and its empire), French in France (and its empire). Whilst the more general cultures of late capitalism have subsequently become increasingly globalised, literary criticism has continued to be residually national in its uses of language. Hence, our second objection to ecocriticism, that it is, to a quite remarkable degree, Anglophonocentric.

Let us note, finally, that ecocriticism has often also been deeply complicit with the kinds of theoretical anti-humanism and epistemological relativism conventionally associated with postmodernism (Oppermann, 2011, 17). This might not, however, be the unmixed blessing Serpil Oppermann imagines it to be. One key aspect of the developing theoretical confluence between ecocriticism and postmodernism is that between longstanding structuralist and post-structuralist critiques of humanism and more recent ecological critiques of anthropocentrism. For Michel Foucault, "man" was famously "only a recent invention, a figure not yet two centuries old, a wrinkle in our knowledge," who "will disappear again as soon as that knowledge has discovered a new form" (Foucault, 1970, xxiii); for the pioneering ecocritic, Lawrence Buell, "the 'I' has no greater claims to being the main subject than the chickens, the chopped corn, the mice, the snakes, and the phoebes — who are somehow also interwoven with me" (Buell, 1995, 179).

But the Anthropocene raises peculiarly thorny questions for ecocriticism, given that Paul J. Crutzen and Eugene F. Stoermer, who originally coined the term, developed an argument that was quite determinedly anthropocentric. They insisted that we have entered a geological era in which the planet's destiny, measured in terms of global warming, species extinction, etc., is now, as a matter of fact, shaped by human technologies. They did so, moreover, on explicitly environmentalist grounds, that is, in order to argue for activist intervention against the effects of anthropogenic climate change. Hence, Luke Hortle's observation, in a commentary on David Mitchell's *Cloud Atlas*, that "the Anthropocene signals the covert apotheosis of a resurgent humanism through its privileging of the human species' destructive homogeneity" (Hortle, 2016, 264), a criticism which deliberately echoes post-structuralist philosophical concerns about the humanism implicit in posthumanism (Colebrook, 2015).

Let me address the argument by way of a brief return to the original debate amongst Earth scientists. Stoermer was Professor of Biology at the University of Michigan and an expert on microalgae; Crutzen was Research Professor of Atmospheric Chemistry at the University of Stockholm and winner of the 1995 Nobel Prize for Chemistry; the body to which they formally proposed the term Anthropocene in 2000, the International Geosphere-Biosphere Programme, or

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IGBP, had been established by the International Council of Scientific Unions in 1987 to study changes in the total Earth system; it oversaw an enormous body of sustained research between then and 2015, when it was succeeded by the Future Earth project. The geological time scale (GTS) conventionally used by Earth scientists distinguishes between aeons, eras, periods and epochs. Measured thus, the last 11,700 years, the period in which human civilisations have existed, comprises the Holocene epoch of the Quaternary period of the Cenozoic era of the Phanerozoic aeon.

The GTS classificatory system is based on the evidence of geological residue and thus tends to register the effects of geology on life, but not those of life on geology. The theoretical novelty of Stoermer and Crutzen's proposal was precisely to assert the obverse, that human life is now significantly transforming the geology of the planet. This met with some initial scepticism, much of which subsequently dissipated. The Working Group on the Anthropocene of the International Geological Congress formally recommended adoption of the term to the 2016 Congress in Cape Town, giving as its preferred date for the beginning of the new epoch, not the Industrial Revolution as it had been for Stoermer, but rather 1950. This later dating arises from the empirical observation that the lead indicators of anthropogenic disturbance to the Earth System all increased very sharply from the middle of the twentieth century. As Crutzen observed in 2003, in an article co-authored with Will Steffen, then executive director of the IGBP, "the Earth System has recently moved well outside the range of natural variability exhibited over at least the last half million years" (Crutzen & Steffen, 2003, 253).

For postmodernists, this science is merely all so much culture, Anthropocene discourse as Foucault might have put it. So, Claire Colebrook dismissively writes that "man's effect on the planet will supposedly be discernible as a geological strata readable well after man ceases to be, even if there are no geologists who will be present to undertake this imagined future reading" (Colebrook, 2014, 10). And Hortle that we "are asked to imagine a world after our extinction in which an impossible future reader (a rational scientist, no less) could interpret our indelible trace in the earth's bedrock" (Hortle, 2016, 267). This is, however, precisely *not* what Earth Science proposes.

The Anthropocene is not in fact a thought experiment as to what some hypothetical future geologist might record, but rather a description of what contemporary Earth scientists actually observe to be happening *now*. So Crutzen and Steffen list twelve indicators of human activity and twelve indicators of resultant changes in the Earth System for the period between 1750 and 2000 (Crutzen & Steffen, 2003, 254–255). How can we explain this radical misreading of science by scholars who have been trained precisely in reading? Commenting on a parallel misreading in the debate over the capitalocene — to which we turn very shortly — Ian Angus observes, first, that the academic left still suffers from the mutual incomprehension between the humanities and sciences which C.P. Snow once diagnosed in terms of the "Two Cultures" (Snow, 1959); and, second, that this "became much worse in the late twentieth century under the influence of the open hostility toward natural science that characterised postmodernism" (Angus, 2017, 82). Regrettably, much of that hostility still bleeds into contemporary ecocriticism.

The capitalocene is to academic Marxism as Anthropocene discourse is to academic postmodernism. The term was coined by Jason Moore in his 2015 book *Capitalism in the Web of Life*, in many respects the most impressive attempt to date to build on the theoretical foundations of ecomarxism. Moore sees the contradiction between capital and nature as equally significant to that between capital and labour; and the capital-nature relation as riven by its own internal contradictions. Capitalism, he writes, is cohered by a law of Cheap Nature, the "relentlessly innovative quest to turn the work/energy of the biosphere into capital" (Moore, 2015, 14). This law can be understood in terms of the Four Cheaps, of labour-power, food, energy and raw materials (Moore, 2015) or the Seven Cheaps of nature, money, work, care, food, energy and lives (Patel & Moore, 2018).

But whilst nature is finite, capital is premised on the infinite: "The great secret and great accomplishment of capitalist civilisation has been to *not* pay its bills"; but the end of cheap nature will bring "with it, the end of capitalism's free ride" (Moore, 2015, 87). There is thus a tendency of the

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ecological surplus to fall, occasioned by entropy, by capitalisation itself, which increases the money cost of the Cheaps, by disproportionality between the reproduction times of capital and nature, and by the fact that accumulation of capital becomes more wasteful over time, to the extent ultimately of activating "*negative-value.*" The language is that of economics, but the substantive issue is that of ecology: negative value is "expressed starkly in contemporary climate change" (Moore, 2015, 98).

This, then, is the capitalocene, "the historical era shaped by relations privileging the endless accumulation of capital" (Moore, 2015, 173). And it dates not from the mid eighteenth century as Stoermer originally understood the Anthropocene, nor from the mid twentieth century as did the Working Group on the Anthropocene, but rather from the origins of capitalism in the fifteenth century. This leads to a model of capitalist development as proceeding through three successive "world hegemonies," each understood as "socio-ecological projects," the Dutch based on timber, the British based on coal, and the American based on oil (Moore, 2015, 163). As a long history of capitalism this is very persuasive, but it nonetheless speaks over, rather than to, the concerns that prompted Crutzen and Stoermer's interventions into the Earth sciences. For, although capitalism might date from the fifteenth century, the key indicators of environmental despoliation clearly date from the nineteenth century. This is precisely the point of Andreas Malm's *Fossil Capital*, a text which also uses the term capitalocene, but which identifies the crucial eco-historical shift as occurring around the British cotton industry's transition from water power to coal power during the late eighteenth and early nineteenth centuries (Malm, 2016).

Detached from the question of historical periodisation, which is crucial for Moore, but not for Malm, the Anthropocene/capitalocene distinction becomes merely one of terminology. And here Moore and Malm are indeed formally correct: it was capitalism as a particular mode of production, including Russian "state capitalism" (Cliff, 1988), rather than humankind in general, that produced anthropogenic climate change. But whatever term these Marxist political economists might prefer, the term chosen by the more "radical" scientists is the Anthropocene. We might add that capitalocene is very obviously an oddly ungainly neologism, and thus likely to be far less rhetorically effective than Anthropocene.

Greening earth: Kim Stanley Robinson

The leading contemporary Anglophone cli-fi writer is arguably Kim Stanley Robinson, already a successful, well-established SF writer when he wrote his first cli-fi novels, the much-celebrated *Science in the Capital* trilogy, comprising *Forty Signs of Rain* (2004), *Fifty Degrees Below* (2005) and *Sixty Days and Counting* (2007). He had won the John W. Campbell Memorial Award for Best SF Novel for *Pacific Edge* (1995) in 1991, Hugo Awards for *Green Mars* (1994) and *Blue Mars* (1996) in 1994 and 1997 respectively, and a Nebula Award for *Red Mars* (1993) in 1993. His work thus enjoyed professional, fan and academic legitimacy. Interestingly, the late Fredric Jameson, the onetime doyen of American academic SF critics, dedicated two books to Robinson (Jameson, 2005, v; Jameson, 2013, v). In 2008 Robinson was even named a "Hero of the Environment" by *Time* magazine (Morton, 2008). His work has also been translated into at least twenty-three other languages, although the complete *Science in the Capital* trilogy only into French and Dutch. And it makes an important contribution to environmental awareness, both amongst the general public and in higher and further education. It is no accident that Robinson's fiction regularly features in programmes on environmental education.

Robinson's fiction is often described as "hard SF" and is justly famous for the quality of its scientific research. But in *The Science in the Capital* trilogy, where the subject matter appeared closest to its author's deepest concerns, the reader is almost overwhelmed by the details, not only of the science, but also of the internal mechanisms of scientific policy-making. Indeed, remarkably little actually happens in the first volume, *Forty Signs of Rain*, until the spectacular flooding of Washington DC at its conclusion (Robinson, 2004, 326–356). *Fifty Degrees Below*, which deals with the stalling of the Gulf Steam, and *Sixty Days and Counting*, which recounts the opening

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stages of the Presidency of the environmentally activist, former Californian Senator, Phil Chase, are faster moving, but still often overburdened with scientific and technical detail. Moreover, the whole trilogy suffers from a preoccupation with American internal politics that might not excite much international interest, even if the US were still the only global superpower.

The trilogy's central protagonist, Frank Vanderwal, is a Californian biomathematician and rock climber, whose initial cynicism about science policy is eventually superseded by active enthusiasm for a Chase administration. Chase himself, a character Robinson takes over from an earlier novel (Robinson, 1997), is an idealised amalgam of an Al Gore who managed to get elected and a Barack Obama who managed to get things done. It is easy to see why American readers might find both Vanderwal and Chase plausible and attractive, but Europeans neither. This is surmise, no doubt, but only the first volume has been translated into Spanish, none into German, Italian, Czech, Polish or Russian (or, for that matter, Japanese or Chinese). In *Green Earth*, the 2015 omnibus edition, the text is reduced by about 300 pages (Robinson, 2015a, xiii) and much of the political and scientific policy detail cut back. Robinson explains that he intended to write a realist novel as if it were SF, describing Washington "as if it were orbiting Aldebaran," but concedes that "afterward it seemed possible that occasionally I might have gone too far" (Robinson, 2015a, xii). It is still too early to judge whether the rewrite has overcome the weaknesses of the original trilogy in the only terms that matter sociologically, that is, those of reader (and translator) response.

Insofar as the *Science in the Capital* trilogy toyed with the notion of a positive outcome from climate change this was centred around the figure of Phil Chase, whose election to the US Presidency offers the promise of a form of adaptation so positive as to border on the utopian. So, in the "Cut to the Chase" blog, written shortly after he survives an assassination attempt, Chase announces that "*Empires are one of the most evil and destructive of human systems,"* but adds that that the United States only "*became an empire by accident*'" Eventually, he promises, "*we will build a culture in which no one is without a job, or shelter, or health care, or education, or the rights to their own life … We'll share the world with all the other creatures. It will be an ongoing project that will never end"* (Robinson, 2007, 478–479). This passage is actually from *Sixty Days and Counting*, but is omitted from *Green Earth*. It's difficult to know why exactly Robinson chose to delete these lines, whether he considered them "telling readers things they already knew," "extraneous details" or "excess verbiage" (Robinson, 2015a, xii). But it strikes me as likely to be none of these. Rather, I suspect the decision arose from a growing awareness, based in the empirical experience of contemporary American realities, of just how implausible it would appear to many readers, perhaps most, that any Democrat President would ever say such things.

Robinson's own account of his utopian novels ends there, but his utopian practice continued thereafter, most immediately with *2312* set in the 24th century and *Aurora*, set between the 26th and 30th centuries. Both are what Raffaella Baccolini and Tom Moylan would call a critical dystopia (Baccolini and Moylan, 2003, 7); both are concerned with climate change; in both, Mars, Venus, Mercury, the Jovian and Saturnine moons, and many of the asteroids are already inhabited by humans, and thereby subject to some degree of terraforming; in both, Earth is depicted as ravaged by the negative consequences of anthropogenic extreme climate change; and in both serious attempts are made to mitigate those consequences. These are at their most spectacular in *2312*, where the protagonists and eventual lovers, the Mercurian artist Swan Er Hong and the Titanian diplomat Fitz Wahram, help to return thousands of extinct or near-extinct species to Earth from the asteroid terraria in which they've been preserved. Robinson's description of the resultant landings is simultaneously inspirational, surreal and vaguely comic (Robinson, 2012, 395). Earth itself, "the planet of sadness" (Robinson, 2012, 303), is still trapped in a system of predatory late capitalism — hence the scale of the environmental damage — but the remainder of the solar system is run along socialistic lines, in a future version of the Mondragon system of workers cooperatives currently operating in Euskadi.

Aurora's main storyline is the attempt to establish a human colony on Aurora, an Earth-like moon of Tau Ceti's Planet E. This is ultimately unsuccessful because, as a dying settler observes,

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"any new place is going to be either alive or dead. If it's alive it's going to be poisonous, if it's dead you're going to have to work it up from scratch" (Robinson, 2015, 178). The colony is abandoned and a minority of the would-be settlers decide to return to Earth. They nearly starve en route but are saved by the wonderfully intelligent "Ship," a quantum computer AI which narrates most of the novel, puts them into hibernation and finally sacrifices itself in order to send 616 survivors back to Earth. The scale of environmental catastrophe only becomes apparent after their return. Sea levels have risen by twenty-four metres during the 22nd and 23rd centuries, all Earth's beaches are drowned and, despite the attempts at carbon drawdown, sea levels have thus far barely fallen: "Yes, they are terraforming Earth … they are calling it a five-thousand-year project … It'll be a bit of a race with the Martians" (Robinson, 2015, 436).

Aurora subverts the conventions not only of the generation starship subgenre, but also of almost all space travel and first contact SF. But its very pessimistic estimate of how long it would take to terraform Earth or Mars — thousands of years — also subverts, or at least runs contrary to, the original expectations of Robinson's own *Mars* trilogy. In the novel's denouement, Freya, the colonists' informal leader, leads the survivors into an alliance with the "Earthfirsters," a group working on landscape restoration, specifically beach return, who are opposed to the deep space exploration advocated by the "space cadets." As one Earthfirster explains to Freya: "We don't like the space cadets … This idea of theirs that Earth is humanity's cradle is part of what trashed the Earth in the first place" (Robinson, 2015, 439). Desperately damaged though Earth undoubtedly is, the still dominant late-capitalist mode of production is subject to clear and effective challenges by utopian enclaves and communities, the latterday Mondragon co-operators in *2312*, the Earthfirsters in *Aurora*. And in both novels, the utopians are firmly on the side of science and scientists.

New York 2140 is the first of Robinson's novels to depict a specifically utopian outcome from global climate crisis. Initially, climate change appears to function only as a dystopian setting: by the early-mid 22nd century sea levels have risen by 50 feet so that the whole of Lower Manhattan has long since been flooded. Mise en scène established, the main plot seems to be a detective mystery about the disappearance of two coders, Ralph Muttchopf and Jeffrey Rose, or Mutt and Jeff, from their temporary home on the farm floor of the Met Life tower on Madison Square. Jeff has already explained to Mutt (and to the reader) why "the world is fucked": "It's not just that there are market failures. It's that the market is a failure" (Robinson, 2017, 4). The mystery narrative turns out to be the trigger for a more important political narrative, which moves the novel towards its eventual utopian climax. And that too is a result of climate change: Hurricane Fyodor batters the city so badly as to prompt what amounts to a popular constitutional revolution.

If *Green Earth*'s Phil Chase had been an Al Gore figure, then the various inhabitants of the Met building in *New York 2140* turn out to be a composite Bernie Sanders, especially Charlotte Armstrong, the radical lawyer who calls in the NYPD to investigate the coders' disappearance. After the hurricane, she persuades her ex-husband, Larry Jackman, now head of the Federal Reserve, that bank nationalisation should be the price for financial bailout and runs for Congress as a Democrat. She is elected, the banks are nationalised, Congress passes a "Piketty tax" on income and capital assets, and "a leftward flurry of legislation" is "LBJed through Congress" (Robinson, 2017, 574, 601, 602, 604). This is as utopian an ending as any in recent cli-fi. And it is complemented by a whole series of individual happy endings: Charlotte herself strikes up a successful romantic relationship with Franklin Garr, a market trader for the aptly named WaterPrice who is 16 years her junior. The key weakness, however, is that all this happiness is far too easily bought, most especially at the political level.

The notion that either of America's two pro-Big Business parties can ever be converted to ecosocialism is surely radically improbable. As Gore Vidal famously observed: "There is only one party in the United States … and it has two right wings: Republican and Democrat" (Vidal, 1977, 268). And at one level Robinson knows this to be the case: "We can't imagine the bridge over the Great Trench, given … the massively entrenched power of the institutions that shape our lives — and the guns that are still there under the table, indeed right on the table" (Robinson, 2016, 8). The improbability level is expanded,

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moreover, by the fact that in the novel neither any significant changes to the American constitution nor to the banking system have been achieved between now and 2140. The President is still not directly elected, the Senate is still ludicrously unrepresentative, the House of Representatives is still elected by the anachronistic first past the post system, in short, it is still an eighteenth-century constitution. As for the banks, they've been bailed out by the US taxpayers three times between 2008 and 2140. Given institutional arrangements as sclerotic as these — arrangements that have survived, and indeed prospered, during a fifty-foot rise in sea levels — how realistically likely is it that all this could be effectively challenged as a result of one hurricane, no matter how devastating? Ultimately, the novel's utopia turns out to be "utopian" in the pejorative sense of being hopelessly impractical.

This "utopianism" is genuinely Robinson's own, nonetheless, not merely that of the novel. As he has himself explained: "We could use the Democratic Party ... to elect a majority in Congress to enact a New Deal flurry of changes. Corporations could squeal but they couldn't make the army go onto the streets against the people. In this country the corporations can't do that" (Robinson & Feder, 2018, 97). Equally improbably, in *Red Moon*, Robinson projects similarly utopian aspirations on to the Chinese Communist Party. This novel is set in 2047-48, the year in which Hong Kong will finally be fully absorbed into the People's Republic of China, when his fictional China has already become the dominant force on the moon. The red moon of the title thus refers literally to a solar eclipse that bathes the moon's surface in dusky red light, but metaphorically to Chinese lunar exploration. The main plot concerns the internal Chinese power struggles in the run up to the Twenty-Fifth Congress of the CCP: President Shanzhai is working to secure the succession for Huyou, minister of state security, the worst of the current "rightist careerists," whilst Finance minister Chan Guoliang and head of the Central Commission for Discipline Inspection Peng Ling are sympathetic to the "New Leftists," who hope to continue Xi Jinping's attempt to steer towards "socialism with Chinese characteristics" (Robinson, 2018, 131–132, 134, 258–259).

The novel's three main characters, who meet on the moon, are: American Fred Fredericks, a technical officer at the Swiss Quantum Works; Ta Shu, a famous Chinese poet and travel journalist; and Chan Qi, daughter of Chan Guoliang, and a leading dissident who is five months pregnant. In different ways, all three are involved in the bloodless revolutions that engulf both the US and the PRC: "In the US, Congress had finished nationalising the major banks ... Demonstrators and some legislators were demanding a universal basic income, guaranteed healthcare, free education, and the right to work, ... In that fundamental sense, it was the same in China" (Robinson, 2018, 432). And once again it all ends happily: Peng is elected President and Chan Premier, Qi has the baby aided by Fred, and everyone escapes repeated assassination attempts by the PLA's reactionary "Red Spear." Robinson's vision of the United States and the People's Republic, the American Democratic Party and the Chinese Communist Party, seems distinctly implausible, to put it mildly.

The Ministry for the Future is perhaps Robinson's most impressive cli-fi novel to date. It depicts a specifically utopian outcome from climate crisis, projecting Robinson's utopianism along a dual constitutional-revolutionary line. The constitutional option revolves around the eponymous Ministry located in Zurich, which is established in 2025 as a Subsidiary Body for Implementation of the Paris Agreement. Its Irish head, Mary Murphy, vaguely reminiscent of Mary Robinson, is the nearest the novel has to a protagonist. The revolutionary terrorist option is represented by the Indian "Children of Kali," who use drones to bring down sixty passenger jets in a matter of hours and, later, to infect millions of cattle with mad cow disease (Robinson, 2020, 229). The novel moves between personal narratives, factual summaries of climate science, and "objective" slices of future history. It opens with an unprecedented heat wave in India which kills twenty million people, viscerally described from the point of view of an American aid worker, Frank May, who becomes the sole survivor of a mass death, subsequently suffers post-traumatic stress disorder and later becomes a comparatively ineffectual ecoterrorist. Robinson's use of the word "poached" in this chapter, to describe the deaths of people fleeing the heat to shelter in a nearby lake, is powerfully disturbing (Robinson, 2020, 12). Subliminally, the catastrophe changes everything, to borrow a phrase from Klein (2014): "The culture of the time was rife with fear and anger, denial

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and guilt, shame and regret, repression and the return of the repressed … the Indian heat wave stayed a big part of it" (Robinson, 2020, 227).

By comparison with Robinson's earlier fictions, *The Ministry for the Future* is more sympathetic to ecoterrorism and also to vegetarianism. So, the narrative voice is broadly in sympathy with the Indian "Children of Kali" terrorists: "many people were quick to point out that these Children of Kali were hypocrites and monsters, that Indians didn't eat cows and … that coal-fired power plants in India had burned a significant proportion of the last decade's carbon burn … Then again those same Indian power plants were being attacked on a regular basis" (Robinson, 2020, 230). Robinson is clear, nonetheless, that ecoterrorism works: "in the forties and ever after, less beef got eaten. Less milk was drunk. And fewer jet flights were made" (Robinson, 2020, 229–230). More significantly, he also suggests that the Children of Kali might be an offshoot of the Ministry itself. Murphy's Indian chief of staff, Badim Bahadur, admits to having established a "black wing" and warns her that "there might be some people who deserve to be killed" (Robinson, 2020, 115).

Later an anonymous narrator, who might well be Bahadur, tells of an encounter with the Children, in which he announced: "I understand you. I've helped you, I've helped work like yours all over the world … I've done more to stop the next heat wave than anyone you have ever met. You've done your part, I've done mine … I am Kali" (Robinson, 2020, 390–391). This combination of constitutionalism and terrorism leads directly to the novel's utopian outcome. But neither of these options owes very much to anything remotely resembling the socialist democracy Robinson himself cheerfully espouses. And, as with *New York 2140* and *Red Moon*, the price of utopia is bought too cheaply to be entirely credible: "Aircraft carriers? Sunk. Bombers? Blown out of the sky. An oil tanker, boom, sunk in ten minutes. One of America's eight hundred military bases around the world, shattered … The war on terror? It lost" (Robinson, 2020, 347). Returning from fiction to reality, the US in the 2020s seemed increasingly likely to leave Robinson's utopianism high and dry. Whether his SF can handle these new lines of political development remains to be seen. But the problem is obvious: if SF is to be more than mere fantasy it needs some reality about which to be realistic.

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