

*Science, Utopianism, and Ecocentric Posterity:
Kim Stanley Robinson's 'Science in the Capital'
and Barbara Kingsolver's Flight Behaviour*

Science and technology provided the methods, the content and the ideology to make a certain kind of future thinkable. It is a future deeply moulded by the belief in progress.

Helga Nowotny, 'Science and Utopia: On the Social Ordering of the Future'

I have an allegiance to community, which includes both my human community and the biological community that surrounds me in this habitat. And I have an allegiance to the possibility of their collective, maybe even collaborative survival into the future.

Barbara Kingsolver, in Stephen L. Fisher, 'Community and Hope: A Conversation'

Since science provides us with information on the causes, impacts, and extent of climate change, it is tempting to look to science too for information on how to mitigate its effects on, and prevent further damage to, an ecocentric posterity of humans and non-humans alike—to look to science, that is, for tools and concepts with which to create and maintain an ecologically sustainable future. The idea of the future within scientific practice, however, is not a straightforward one: on the one hand, science is a process-oriented—indeed, one could say, future-oriented—activity, inasmuch as it is predicated on advancement and enlightenment; on the other hand, science holds itself aloof from the ethical, psychological, and emotional decisions that inform what that future should look like.

Certainly, a particular construction of the future, or at least the idea of progress, is essential to the project of science. Progress in these terms signals an idealised, intellectual march towards the future—a collaboration of minds, aimed at ever greater knowledge about and discovery of the species, systems, and processes that make up the non-human world that interacts with, exists around, and even occurs within humans. Such progress, however, is essentially an 'objective' endeavour—it is value-free at the level of

determining what that endeavour should achieve (though not at the level of whether that endeavour might be immediately harmful to humans and non-humans, as scientific ethics committees around the world would attest). This can be seen in the relationship between scientific progress and economic progress. On the one hand, science would seem to be opposed to the standard economic narrative of progress – ongoing economic growth, technological advancement, industrial expansion, and material comfort for humans. The scientific ideal of enhancing our understanding of the (non-human and human) world seems inimical to the economic story of human exceptionalism and the damage it is capable of inflicting on non-human organisms, systems, and environments, not to mention the harm that rebounds onto humans. On the other hand, scientific progress informs and makes possible the increased technological sophistication that underpins economic progress. Scientific knowledge is politically, morally, and ideologically appropriable, even to anthropocentric social practices and systems that might be egregious to science's objects of study.

In other words, the knowledge needed to meet present obligations to the humans and non-humans of the future is, in large part, granted by science, but for ethical guidance towards an explicitly better future one must look elsewhere. An ethical, hopeful version of scientific endeavour – what I call a utopian vision of science – requires a particular combination of science with values and practices extrinsic to it.

In this chapter, I discuss two climate change narratives with utopian views of science that are enabled by the practice of compassion or care. I begin with Kim Stanley Robinson's 'Science in the Capital' trilogy of *Forty Signs of Rain* (2004), *Fifty Degrees Below* (2005), and *Sixty Days and Counting* (2007).¹ Robinson's narrative combines science with the teachings of Buddhism to create a utopian project to mitigate against and even reverse some of the worst effects of global warming. With his focus on community, whether scientific or religious, Robinson usefully imagines a commitment to posterity outside the bounds of parent–child relations and ethics. Yet the scope of this posterity does not extend far, for it deals with human concerns and human futures. Thus, despite its engagement with science and notions of scientific progress, and, indeed, with Buddhism, the novel's eudaemonistic circle of concern is, broadly speaking, a human one. I then turn to Barbara Kingsolver's *Flight Behaviour*

¹ Kim Stanley Robinson, *Forty Signs of Rain* (first published 2004; London: HarperCollins, 2005); *Fifty Degrees Below* (first published 2005; London: HarperCollins, 2006); *Sixty Days and Counting* (London: HarperCollins, 2007). Subsequent page references to these texts are in parentheses.

(2012).² Kingsolver's novel, like Robinson's trilogy, attempts to leaven science with an ethical stance; in her case, however, this ethics is explicitly derived from parental care. Indeed, the novel clearly invites a eudaemonistic enactment of empathy and sympathy with the parental actions and disposition of its protagonist, and with the future of the humans and non-humans under her care. On one reading, Kingsolver's narrative, like Robinson's, is stubbornly anthropocentric, engendering a sympathy for the fate of non-human species and ecosystems but subsuming these within a greater sympathy for and interest in the future of the humans of the novel, particularly, the heroine and her family. However, on another reading, one that pays close attention to the novel's tragic conclusion, the novel ends on an insistently ecocentric note. Indeed, it does not simply widen the eudaemonistic circle of care; it shifts it from the human to the non-human. It does this on the basis of what Martha Nussbaum has called non-human 'wonder', a concept productively read in dialogue with Chris Cuomo's ethics of flourishing based on 'dynamic charm'.³ In what follows, I set out the relationship between science and utopian hope, and show how this is framed by Robinson's novels. I then discuss and clarify the ecocentric possibilities of wonder or dynamic charm, as a prelude to two readings of Kingsolver – the anthropocentric celebration of parenthood and the ecocentric revelation of dynamic charm.

The Utopianism of Science

Many scientists would agree that the aim of science is to move towards an understanding of the 'truth about physical reality', that is, rational and objective (or testable) truths about the state of the world.⁴ Truth is the goal of the scientific method, by which I mean not just the empiricist conventions of observing, experimenting, and collecting data, but the practice of hypothesising – putting forward a hypothesis and then conducting empirical research in order to support or refute, that is, refine, this hypothesis.⁵ As Karl Popper insisted, and Peter Medawar would go on to clarify, such 'hypothetico-deductive' refinement depends less on inductive reasoning

² Barbara Kingsolver, *Flight Behaviour* (London: Faber, 2012). Subsequent page references to this text are in parentheses.

³ Martha C. Nussbaum, *Upheavals of Thought: The Intelligence of Emotions* (Cambridge University Press, 2001), p. 321; Chris J. Cuomo, *Feminism and Ecological Communities: An Ethics of Flourishing* (London: Routledge, 1998), p. 71.

⁴ Hugh G. Gauch, *Scientific Method in Practice* (Cambridge University Press, 2003), p. 409.

⁵ *Ibid.*, pp. 406–9, citing G. E. P. Box, W. G. Hunter, and J. S. Hunter, *Statistics for Experimenters: An Introduction to Design, Data Analysis, and Model Building* (New York: John Wiley, 1978), p. 4.

(broadly definable as the drawing of conclusions based on observation) and more on deductive reasoning (the use of observations to refine a previous hypothesis).⁶ This reasoning and refinement, moreover, is often imagined as a collective endeavour, as scientists build on the work of other scientists, and expect that at all times results will be disseminated widely. What I describe here is a deliberately forward-looking as well as collaborative activity. It imagines a longitudinal enterprise carried out by dispersed actors over time and space, whose ultimate goal – sought step by step – is truth. For this reason, as science studies pioneer Helga Nowotny reminds us, the refinement of the scientific method in the nineteenth century ‘made a certain kind of future thinkable’, a future ‘deeply moulded by the belief in progress’.⁷ In other words, science is driven by a notion that the future holds – indeed, is equivalent to – cumulative knowledge and enlightenment.

Science understood thus could be called a utopian project. Of course, such a claim depends much on how one defines science. I acknowledge that the conceptualisation of science I outline here is a particular view, subscribed to by scientists, but not necessarily born out in practice. One must be careful to distinguish between the ideology that undergirds scientific activities and the discrete activities themselves. For Thomas Kuhn, the everyday work of ‘normal science’ has little to do with the paradigm shifting of ‘revolutionary science’: the normal scientist solves relatively local problems within a given paradigm, and only a particularly stubborn problem or set of problems would result in a rethinking of the paradigm itself.⁸ At this point, it must be said that the emphasis on revolutionary over normal science differs between scientific disciplines – for example, the biological sciences operate within what is accepted as the relatively durable paradigm of Darwinian theory while the expectation in physics, what with comparatively recent upheavals such as relativity and quantum mechanics, is that there may yet be more major shifts to come. Even so, many scientists across the fields – who can hardly be assumed to be working in ignorance of Popperian and Kuhnian descriptions of their endeavours – tend to see both the ‘consensus’ research of normal science and the major discoveries of

⁶ Inductive reasoning might, however, play a part in the formulation of the earlier hypothesis; see Karl Popper, *The Logic of Scientific Discovery* (first published 1959; London: Routledge, 1992), pp. 3–7; Peter Medawar, *Induction and Intuition in Scientific Thought* (London: Methuen, 1969), p. 48.

⁷ Helga Nowotny, ‘Science and Utopia: On the Social Ordering of the Future’, in Everett Mendelsohn and Helga Nowotny (eds.), *Nineteen Eighty-Four: Science between Utopia and Dystopia* (Dordrecht: Reidel, 1984), p. 8.

⁸ Thomas S. Kuhn, *The Structure of Scientific Revolutions* (first published 1962; University of Chicago Press, 1996), pp. 52–76.

revolutionary science as differently sized – and sometimes ‘tentative’ and ‘approximate’ – steps towards truth.⁹

To describe science as utopian depends, too, on how one defines utopia. The idea of science as perfectibility is not readily compatible with the notion of utopia as perfection; the one suggests progress and the other attainment. Science, in utopian scholar Krishan Kumar’s idealist description of it, ‘knows no end. It has no point of rest or stability. It constantly undermines existing beliefs and practices’.¹⁰ The utopia, in contrast, suggests just such an end. To be fair, this has led both writers and scholars of utopia to distinguish between the pure utopia and other forms, such as the ‘critical utopia’, whose narratives, according to Tom Moylan, ‘reject utopia as blueprint while preserving it as a dream’.¹¹ In considering the utopianism of science, then, it pays to distinguish, as Patrick Parrinder does, citing the work of H. G. Wells, between ‘the classical utopia of static perfection and the “modern” utopia characterised by a continuous process of political and social improvement’. For Parrinder, the modern utopia is more appropriately described as ‘uchronia’, so committed is it to a ‘kinetic’ mode of hopeful, forward movement.¹² Or, following Carl Freedman, one could distinguish between the traditional, topographical utopia inaugurated by Thomas More and the ‘hermeneutic’ utopia theorised by Ernest Bloch – a psychological and philosophical stance, rather than a place, ‘to be found in the Not Yet, or the Not-Yet-Being, or the In-Front-of-Us’.¹³ In referring to the utopianism of science, then, I am invoking not just the conventional conceptualisation of science as an aggregation towards truth, but also Wellsian and Blochian understandings of modern utopia as mobile. These are all relevant to the idea that underpins the scientific method – that science is a collaborative and gradual advancement of human knowledge.

For all this, however, science is not *overtly* utopian; that is, it is wary of advertising its efforts towards truth. As I have already suggested,

⁹ Gauch, *Scientific Method in Practice*, p. 99, quoting from American Association for the Advancement of Science, *The Liberal Art of Science: Agenda for Action* (Washington, DC: American Association for the Advancement of Science, 1990), p. 20.

¹⁰ Krishan Kumar, *Utopianism* (Milton Keynes: Open University Press, 1990), p. 59.

¹¹ Tom Moylan, *Demand the Impossible: Science Fiction and the Utopian Imagination* (New York: Methuen, 1986), p. 10.

¹² Patrick Parrinder, *Utopian Literature and Science: From the Scientific Revolution to Brave New World and Beyond* (Basingstoke: Palgrave-Macmillan, 2015), p. 4.

¹³ Carl Freedman, ‘Science Fiction and Utopia: A Historico-Philosophical Overview’, in Patrick Parrinder (ed.), *Learning from Other Worlds: Estrangement, Cognition, and the Politics of Science Fiction and Utopia* (Liverpool University Press, 2000), p. 74.

objectivity, that mainstay of the Popperian scientific method, precludes the expression of wishfulness and the normative push towards what is ethically 'right' that some might associate with utopian thinking. For Popper, following Immanuel Kant, 'scientific knowledge should be *justifiable*, independently of anybody's whim: a justification is "objective" if in principle it can be tested and understood by anybody'.¹⁴ One could say that the practitioners – and, with it, the practice – of the scientific method are to some degree informed by a utopian ideology, even if they do not explicitly espouse it. Ethical duty is, apparently, for others to impute to science, and not for science to ascribe to itself.

Such a task has often fallen to those who would communicate or popularise science, including the authors who employ scientific understandings in climate change novels. The utopian potential of science has been a theme in science fiction since the advent of modern science in the nineteenth century: novels such as Edward Bellamy's *Looking Backward* (1888) and Wells's *A Modern Utopia* (1905) have shaped their utopian worlds out of scientific and technological advances.¹⁵ This is not to suggest that there has been universal utopianism in science fiction: many twentieth-century dystopian fictions have associated scientific progress with psychological and cultural alienation, from Aldous Huxley's *Brave New World* (1932) to Margaret Atwood's *The Handmaid's Tale* (1985). Even in green utopian science fiction narratives, such as Ursula K. LeGuin's *The Dispossessed* (1974) and Ernest Callenbach's *Ecotopia* (1975), the potential gulf between naïve technological determinism and a just utopian society has continued to be a topic of concern and scrutiny. Nonetheless, this possibility of science as itself compromised has led to a distinctive recent brand of scientific utopianism, centred on the figure of the scientist as a lone heroic voice, a trend that Roslynn Haynes analyses as part of a late-twentieth-century stereotype of 'scientist as idealist'.¹⁶ Haynes astutely ascribes the rise of the idealist scientist in literature towards the end of the century to a growing environmental awareness among authors and readers. Indeed, the type of the utopianist scientific hero becomes pertinent in a time of global ecological concerns.

¹⁴ Popper, *The Logic of Scientific Discovery*, p. 22.

¹⁵ Darko Suvin, *Metamorphoses of Science Fiction: On the Poetics and History of a Literary Genre* (New Haven, CT: Yale University Press, 1979), p. 4.

¹⁶ Roslynn D. Haynes, *From Faust to Strangelove: Representations of the Scientist in Western Literature* (Baltimore, MD: Johns Hopkins University Press, 1994), pp. 311–12.

'Science in the Capital'

Perhaps the most rigorous literary defender of scientific utopianism in recent times is Robinson. A major science fiction writer, with both the Hugo and Nebula awards to his name, Robinson displays in his work a profound interest in science and politics. Many of his novels are explicitly utopian scenarios for environmental and social justice that successfully combine scientific technology and progressive politics. His first novels – the 'Three Californias' trilogy of *The Wild Shore* (1984), *The Gold Coast* (1988) and *Pacific Edge* (1990) – are experiments in narrating disaster, dystopia, and utopia respectively, ultimately imagining the successful green reconstruction of a devastated California. More sustained in its utopianism is Robinson's great critical and popular success, the Mars trilogy of *Red Mars* (1992), *Green Mars* (1993), and *Blue Mars* (1999), an elaborate narrative in which human colonisers on Mars successfully terraform the planet – that is, transform its biosphere into a version of Earth's – by living a kind of scientifically informed, ethically minded, green socialism called 'eco-economics'.¹⁷ The utopian terraforming of Mars thus provides a space in which the physical alteration of the planet coincides with the political conversion of its new inhabitants, that is, 'humans are areoformed – shaped by Mars – even as Mars is terraformed'.¹⁸ The 'Science in the Capital' trilogy might represent a rare foray for Robinson into near contemporary realism and away from the futuristic science fiction of much of his work, but it constitutes a high point in Robinson's environmental fiction inasmuch as it spells out, in a narrative space free of otherworldly distraction, his ideas for scientific utopianism in the service of environmentalism.¹⁹

Robinson explicitly identifies himself as a utopian science fiction writer, and, in doing so, demonstrates a scholarly awareness of its generic history. Speaking of the Mars trilogy, Robinson has employed a definition that echoes Parrinder's formulation of it as kinetic. He rejects static descriptions of 'Utopia as "pie-in-the-sky", impractical and totalitarian', and instead

¹⁷ The idea of 'terraforming' was invented by science fiction writer Jack Williamson in 1942; see Brian Stableford, 'Science Fiction and Ecology', in David Seed (ed.), *A Companion to Science Fiction* (Malden, MA: Blackwell, 2005), p. 134, and Robinson, *Imagining Abrupt Climate Change: Terraforming Earth* (Seattle: Amazon Shorts, 2005), p. 1. For a description of 'eco-economics', see Robinson, *Red Mars* (New York: Bantam, 1993), p. 298.

¹⁸ Frederick Buell, *From Apocalypse to Way of Life: Environmental Crisis in the American Century* (New York: Routledge, 2003), p. 279.

¹⁹ Adam Trexler, focusing on the novels' politics, labels this a 'technocratic, even bureaucratic, utopianism', *Anthropocene Fictions: The Novel in a Time of Climate Change* (Charlottesville: University of Virginia Press, 2015), p. 155.

insists, 'Utopia has to be rescued as a word, to mean "working towards a more egalitarian society, a global society".'²⁰ Fredric Jameson writes of the Mars trilogy that, even in its conclusion, the reader is aware that the 'achievement' of utopia on Mars 'must constantly be renewed', so much so that 'utopia as a form is not the representation of radical alternatives; it is rather simply the imperative to imagine them'.²¹ Robinson retains such an emphasis with the 'Science in the Capital' trilogy, remarking:

I think of myself as a utopian novelist . . . Utopia is a name for one course of history, a progressive course in which things become more just and sustainable over the generations. We're not there now, but depending on what we do, and what our descendants do, we could still be said to be living in a utopian history, as being on the path. I prefer to work as if that were the case. And it seems to me the great work continues.²²

Thus, for Robinson, goodness exists not as panoply, in a simple utopian sense, nor even as possibility, in Moylan's critical utopian sense, but as perfectibility, with that perfectibility premised on a mapping of scientific practice onto scientific ideals.

Forty Signs of Rain (2004), *Fifty Degrees Below* (2005) and *Sixty Days and Counting* (2007) acquired the informal label of the 'Science in the Capital' trilogy from the author's working title for the first novel in the sequence.²³ As with the 'Mars' trilogy, the three novels are ideally discussed together, as they resemble not just a trilogy but a single text in the style of a Victorian triple-decker, as Robinson has himself indicated.²⁴ Indeed, they have more recently been abridged and re-issued as a single novel, *Green Earth* (2015).²⁵ The scenario depicted in the novels is one of 'abrupt climate change', a term and concept Robinson borrowed from a 2002 report to the National Research Council that reconceptualised climate change as possible within three to five years.²⁶ The trilogy narrates global climate catastrophe from

²⁰ Bud Foote, 'A Conversation with Kim Stanley Robinson', *Science Fiction Studies* 21.1 (1994), 56.

²¹ Fredric Jameson, "If I Can Find One Good City, I Will Spare the Man": Realism and Utopia in the Mars Trilogy', in Patrick Parrinder (ed.), *Learning from Other Worlds: Estrangement, Cognition and the Politics of Science Fiction and Utopia* (Liverpool University Press, 2000), p. 231.

²² Imre Szeman and Maria Whiteman, 'Future Politics: An Interview with Kim Stanley Robinson', *Science Fiction Studies* 31.2 (2004), 185.

²³ Robinson changed the names of his second and third novels, 'The Capital in Science' and 'Global Cooling', when his publisher insisted on more 'novelistic' titles; Moira Gunn, interview with Kim Stanley Robinson, *Tech Nation: IT Conversations*, 4 April 2007, <http://itc.conversationsnetwork.org/shows/detail1773.html>.

²⁴ Robinson, *Imagining Abrupt Climate Change*, p. 16; David Seed, 'The Mars Trilogy: An Interview', *Foundation* 68 (1996), 76.

²⁵ Robinson, *Green Earth* (New York: Del Rey, 2015).

²⁶ Robinson, *Imagining Abrupt Climate Change*, p. 6.

the perspective of a group of scientists and policy wonks in Washington, DC: biologist Frank Vanderwahl; Diane Chang, the director of the National Science Foundation, or NSF; fellow NSF scientist Anna Quibler; and Anna's husband, Charlie, environmental advisor to the ecologically committed Senator Phil Chase. Also depicted are the Quiblers' young children, Nick and Joe. In the course of events, Washington, DC, experiences extreme floods and record-breaking winters, with this microcosm dramatically emblematic of global chaos, climatic and otherwise: 'they were entangled in a moment of history when climate change, the destruction of the natural world, and widespread human misery were combining in a toxic and combustible mix' (*Fifty*, 4). Yet, the narrative's tone and dénouement are hopeful and happy: the scientists' lives acquire a spiritual depth thanks to their friendship with a group of political exiles from the fictional Buddhist island nation of Khembalung; lonely misfit Frank finds true – if unlikely – love with a government intelligence agent enmeshed in rogue secret service operations; and romance blossoms between Phil Chase and Diane Chang, who end the narrative as, respectively, President and Presidential Science Advisor. Diane and Phil's wedding is the comic happy ending of the trilogy, just as Anna and Charlie's marriage provides its ballast.

The trilogy's moral, then, is that science and politics in concord will save the day – such concord enables the narrative's large-scale scientific interventions, which ultimately mitigate and stabilise the many climate change disasters. But Robinson's scientists must learn not only to engage with policy but to refine and acknowledge their scientific aspirations, ensuring that 'normal science' is leavened with a compassionate outlook. This much is put into train when the Khembalis, whose home is affected by rising sea levels, establish an embassy in an office in the NSF building. When they are invited by Anna to give an NSF seminar on Buddhist ideas of knowledge and progress, they propose a marriage of scientific with Buddhist enlightenment, that is, the introduction of compassion to scientific ratiocination. As the Khembali spiritual leader Rudra Cakrin explains, compassion is definable as 'Right action. Helping others. . . . Reduce suffering' (*Forty*, 236). The knowledge gained by science and the compassionate wisdom of Buddhism make them 'parallel studies', according to Rudra Cakrin, in which science has 'specialized, through mathematics and technology, on natural observations, finding out what is, and making new tools', while 'Buddhism has specialized in human observations, to find out – how to become. Behave. What to do. How to go forward' (*Forty*, 236). That is, the two are complementary.

What is more, the novel frames the interweaving of Buddhism with science not as a simple ideological choice but as a biological imperative. Rudra Cakrin aligns the Buddhist concept of ‘compassion’ with scientific understandings of ‘altruism’ as the ‘best adaptive strategy’ (Forty, 238); that is, fellow feeling has been identified by behavioural ecologists as one way for species to ensure their survival: ‘in Buddhism we have always said, if you want to help others, practice compassion; if you want to help yourself, practice compassion. Now science adds, if you want to help your species, practice compassion’ (Forty, 238). This echoes Frank’s conclusions in his ongoing sociobiological observations and analyses of fellow human beings. Earlier in the novel, when stuck in a queue of cars on the Beltway in Washington, DC, Frank reflects on how the merging of two lanes of traffic replicates the prisoner’s dilemma – the game theory scenario in which, as discussed in chapter 1, two prisoners are kept separate and each is asked to inform against the other in order to gain his release. Assuming that the game is only played once, the best strategy is the selfish one of informing; if the game is played many times with the same opponent, the best strategy – and arguably the one that is eventually learned – is for both prisoners to cooperate and remain silent. Translated into the experience of driving in merging traffic on the Beltway, this predicts that if drivers base their decisions on individual good (with each vehicle cutting off merging traffic and trying to get ahead), delays result, but, if drivers act towards the common good (by taking turns), traffic flows more easily. Frank muses, ‘In traffic, at work, in relationships of every kind – social life was nothing but a series of prisoner’s dilemmas. Compete or cooperate? Be selfish or generous? It would be best if you could always trust other players to cooperate, and safely practise always generous’ (Forty, 112). When translated into optimal behaviour in the Anthropocene, humans must learn the answer to the prisoner’s dilemma. Frank realises, as he listens to Rudra Cakrin’s lecture, that ‘it is an invocation for all to make the “always generous” move, for maximum group return, indeed maximum individual return’ (Forty, 238). As Timothy Morton notes, ‘hyperobjects’ have brought future humans ‘into the adjoining prison cell’.²⁷ Climate change, according to Frank, the Khembalis, and indeed the trilogy, is the prisoner’s dilemma writ large, while the union of politics and science – when science is a compassionate version of itself – is the intergenerational solution that humans have evolved to make.

²⁷ Timothy Morton, *Hyperobjects: Philosophy and Ecology after the End of the World* (Minneapolis: University of Minnesota Press, 2013), p. 123.

Following Frank's lead, the NSF enters a renewed phase of compassionate science, achieved through the cooperation of Diane, Frank, and Anna; here, Robinson's preference for detailed plot interactions and character ensembles plays out in terms of form the idea of collaboration that is at the heart of the novel in terms of theme. Through their actions, large-scale, international, geoengineering projects are enacted, including the salinisation of the Atlantic to reactivate the Gulf Stream and the use of genetically modified species of lichen to encourage tree growth in a massive carbon sequestration farm in Russia. And, when Phil Chase is elected president, his left-leaning, socially minded, long-termist policies provide the ideal context for a Buddhist-inflected scientific enlightenment to be translated into action. He negotiates, among other things, a deal with an environmentally devastated China in which the United States sends technological and financial aid to help build a greener Chinese economy in return for China's agreement to a carbon cap.

One might think that Robinson's foreshortened version of evolution, in which compassion emerges as an adaptive strategy, would place an emphasis on present obligations to future generations and specifically on parental care as a way of achieving this relatively short-term adaptation. Certainly, Robinson's public statements on climate change have focused on the importance of recognising our intergenerational legacy and invoked parenting as an analogy: climate change represents the utilitarian exploitation of future humans – 'the victims in this competition are the future generations to come' – and behavioural change as an adaptive strategy is akin to 'a mother–daughter chain, of generations holding hands'.²⁸ In Robinson's novels, however, posterity, as a joint concern of politics, science, and the spiritual expression of compassion, is a social and collaborative concern, rather than a familial one. That cooperation based not on 'kinship' but on 'empathy' might be beneficial to evolution is precisely what Frank reads in the science journal *Nature*, his conclusion being that this is 'group selection' but only if individuals realised that 'other groups' constituted a larger group: 'the story of human history so far [was] successive enlargement of the group' (*Fifty*, 282). Frank's sociobiological analysis of 'altruism-as-adaptation' (*Fifty*, 281) is increasingly refined, then, to encourage collaboration with, or being 'always generous' to, all humans. It would seem, then, that parent–child relationships are hardly the place to look in the novel for expressions of passing on environmental legacy; indeed, children are cared

²⁸ Robinson, 'Climate Change and the Pursuit of Happiness', lecture at Sustainable Actions for a Sustainable Future Conference, Missouri State University, 22 April 2009.

for and cared about outside domestic, secure spaces, as well as within them. Thus, when the Quiblers' young son, Joe, is suspected by the Khembalis to be an incarnation of Rudra Cakrin upon his death, Joe is closely watched, cared for, and, indeed, loved by that community; meanwhile, his brother, Nick, is mentored by Frank and encouraged in his scientific interests.

Moreover, parenting emerges, for the parental characters themselves, as one of many manifestations of the self. Near the end of the final novel, for example, Anna and Charlie take delivery of photovoltaic panels for their home; this is not framed as a domestic issue but, rather, occurs alongside the information they exchange and political actions that they make as a scientist and a policy advisor. Even Charlie's decision to give up working full time for Phil Chase is about assuming a range of roles and identities rather than defining himself as any one of these: his departure from Phil's staff is neither permanent nor total, as he promises it will be for a 'couple of years' (*Sixty*, 457) and he commits to daily phone conversations with the White House staff. After all, as Frank discovers in the second novel when he becomes homeless and divides his time between a neo-palaeolithic existence in Rock Creek Park and his work at the NSF, life is 'parcellated': 'No one saw enough to witness your life and put it all together' (*Fifty*, 74). Such a parcellated life is divided up among multiple and shifting identities.

Accordingly, the reader is not called on to identify with any one character, either for very long or in any strictly focalised way. Although it is possible to identify Frank as the central character, it is significant that his experiences do not come to the fore until the second novel; the first novel opens with Anna and expends narrative energy on the Quiblers, energy which is then diffused in subsequent instalments in the trilogy. Another, perhaps more obvious candidate for the role of hero is "*Unconventional, unpredictable, devil-may-care*" (*Sixty*, 49; original emphasis) Phil; yet, even this mercurial character enjoys only a brief moment of focalisation when he takes office at the start of the third novel. Finally, one might, as Adam Trexler does, focus on Diane as the initiator of the scientific and political collaborations and renegotiations – or 'boundary work' – that so dramatically resolve the novel's climate change crises, and identify her as the true 'embodiment of the NSF's power, will, and effectiveness'.²⁹ Even so, Diane is only one of many important actors in the drive to the plot's resolution (and her identity is, one might add, formed – in the Arendtian mode discussed in the previous chapter – in coalition and dialogue). It would

²⁹ Trexler, *Anthropocene Fictions*, p. 160.

seem, then, that the nature of Robinson's collaborative and coalitional utopian vision does not require exclusive reader identification.

That is, Robinson's trilogy eschews the usual patterns of identificatory plot and character development, and, along with this, subsumes parental care, attachment, activities, and identity within characters' public and communal roles, all under the rubric of a larger compassion and empathy. Intergenerational care is not only reassigned away from the private and domestic and towards the scientific and political, it is also concerned with non-human animals. It is not just that Frank's Palaeolithic experiment makes him aware of his status as a human animal – as 'Primate in forest' (*Fifty*, 40) – but it is also that the novel depicts the effects of the many extreme weather events on zoo animals, showing how many die or escape, as Frank comes to be involved with these animals as a volunteer tracker.

Yet, the trilogy's admirable version of posterity is not as radical as it could be, even as it gestures to the inclusion of the non-human, the need to redefine notions of compassion and care, and the instability of identity. In the final analysis, these are relayed as descriptions of the actions of a small group of people in a plot that, for all its mentions of nations and groups from elsewhere in the world, represents a heteronormative and mostly white version of American life and is focused on a narrowly American and anthropocentric solution – specifically, geoengineering projects initiated by top-down federal government – to a crisis of unprecedented spatial and temporal scale and complexity. Ursula Heise notes that the trilogy 'remains for the most part stuck in Washington and American government perspectives . . . and the omniscient narrator never relinquishes his grip of this local scene to let other perspectives and discourses percolate', a point echoed by Trexler.³⁰ Timothy Clark, citing 'the way Washington politics is simplified' and the presence of 'so US-centric a focus on a global issue' in the novels, concludes that 'even Robinson's ambitious project is a form of intellectual miniaturization'.³¹ Moreover, Jeanne Hamming reads Robinson's attempt at rewriting the gender and racial norms that inform environmental attitudes as ultimately collapsing into a preoccupation with white, American masculinity: 'any attempt to articulate a post-national, post-global-warming subjectivity can only reproduce . . . the very power structures that continue to drive American identity and environmental

³⁰ Ursula K. Heise, *Sense of Place and Sense of Planet: The Environmental Imagination of the Global* (New York: Oxford University Press, 2008), p. 207; Trexler, *Anthropocene Fictions*, p. 166.

³¹ Timothy Clark, *Ecocriticism on the Edge: The Anthropocene as a Threshold Concept* (London: Bloomsbury, 2015), p. 79.

politics'.³² Similarly, the extent of the effect of biospheric devastation on ecosystems and species is reduced to particular types of charismatic animal experiences, a disregard for ecological complexity that is not helped by the novel's optimistic reading of evolutionary process.

Radical Ecocentric Posterity

What possibilities might there be for a radical ethical concern for the future that includes non-human organisms, communities, and processes within the compass of moral considerability, not simply for their ability to increase humans' flourishing, but for their own and other non-human flourishing? Put another way, what might an ecocentric scientific utopianism look like? As I suggested in chapter 1, there is a useful distinction to be made between the two types of human ethical responses to the non-human put forward by Nussbaum. The first is a eudaemonistic account, which, in Nussbaum's terms, is a sympathetic response to a non-human animal in which its distress, suffering, or other non-flourishing suggests a 'common vulnerability' with the human witnessing that distress; it requires, therefore, a recognition of shared grounds of suffering between the human and non-human, such as pain and hunger.³³ The second is one of wonder at the marvellous complexity of the non-human animal.³⁴ For Nussbaum, the two are usually linked in some way (with wonder as a support and motivation for sympathy); crucially, however, Nussbaum speculates that they are separate emotions.³⁵ More importantly for my purposes here, Nussbaum clarifies elsewhere that wonder as the basis for an ethical attitude to non-human animals is not about the relevance of the non-human to human flourishing. She extends the capabilities approach of Amartya Sen (extrapolating from the concept of eudaemonia to argue that the capability, or freedom, to achieve eudaemonia is a fundamental freedom) to include human as well as non-human animals, and bases this measure of capability on the wonder of non-human animals: 'if we feel wonder looking at a complex organism, that wonder at least suggests the idea that it is good for that being to flourish as the kind of thing it is'.³⁶ This element of wonder asks for an understanding of non-human suffering as

³² Jeanne Hamming, 'Nationalism, Masculinity, and the Politics of Climate Change in the Novels of Kim Stanley Robinson and Michael Crichton', *Extrapolation* 54.1 (2013), 42.

³³ Nussbaum, *Upheavals of Thought*, p. 319. ³⁴ *Ibid.*, p. 321. ³⁵ *Ibid.*, p. 322.

³⁶ Nussbaum, 'Beyond "Compassion and Humanity": Justice for Nonhuman Animals', in Cass R. Sunstein and Martha C. Nussbaum (eds.), *Animal Rights: Current Debates and New Directions* (Oxford University Press, 2004), p. 306.

appropriate to that organism and the system in which it exists, as far as possible: 'It wants to see each thing flourish as the sort of thing it is.'³⁷

Nonetheless, Nussbaum's use of wonder in this way is limited by a need to draw the line of moral considerability somewhere: that is, not every organism is capable of invoking wonder. Building on Peter Singer's animal-rights utilitarianism, which proposes a calculus of moral inclusion for humans and non-humans based on sentience (the more sentient a being, the greater its rights and its importance in calculations of utility), Nussbaum adds, citing James Rachels, the criterion of complexity.³⁸ Both the ability to feel pain and the vulnerability to it, thanks to the diversity of harms that might occur in the life of a complex being, are thresholds to membership of this moral community of human and non-human beings: 'More complex forms of life have more and more capabilities to be blighted, so they can suffer more and different types of harm.'³⁹ Nussbaum's position, focused on individuals, precludes a consideration of the ecological interactions played by all organisms, missing, for example, the significant potential for harm to beings on the wrong side of the sentientist line to bring harm to those on the right side of it. Moreover, the judgement of moral considerability based on sentience and complexity is predicated on a very human understanding of pain and distress; certainly, to some extent, an ethical response to the non-human will always demand a human perception and calibration, but Nussbaum's account of the limits of wonder reproduces the limitations of eudaemonistic responses to non-human suffering: it is suffering when the human can imagine that it is.

Where, then, might a third response, more than either eudaemonism or wonder, come from? The ethical model put forward by Cuomo offers a promising set of proposals. Cuomo's work on environmental ethics stems from an ecofeminist concern, like that of Catriona Sandilands, with the risks of applying an identitarian and essentialist logic to terms such as 'women' and 'nature'.⁴⁰ Cuomo particularly cautions against 'representing humans, women or nature in ways that are static and bounded'.⁴¹ At the

³⁷ Ibid., p. 306.

³⁸ Ibid., p. 308; Peter Singer, 'Animals and the Value of Life', in Tom Regan (ed.), *Matters of Life and Death: New Introductory Essays on Moral Philosophy*, 3rd edn. (New York: McGraw-Hill, 1993), pp. 280–321; James Rachels, *Created from Animals: The Moral Implications of Darwinism* (Oxford University Press, 1990).

³⁹ Nussbaum, 'Beyond "Compassion and Humanity"', p. 309.

⁴⁰ Catriona Sandilands, *The Good-Natured Feminist: Ecofeminism and the Quest for Democracy* (Minneapolis: University of Minnesota Press, 1999).

⁴¹ Cuomo, *Feminism and Ecological Communities*, p. 34.

same time, Cuomo is mindful of the need to account for humans' ethical position vis-à-vis the non-human; as she reminds us: 'Although nature and human nature cannot provide universal, static norms, it is still meaningful to characterize the social/natural world as comprised of ethical agents and objects with interests and levels of well-being.'⁴² Like Nussbaum, what Cuomo proposes is an ethics of flourishing, inspired in part by Aristotle's terms of *eudaimonia*; she contends that the value of the flourishing of non-human beings lies in their constitutive value to other beings, including – but not restricted to – humans. In a suggestive combination of Aristotelian and Leopoldian sensibilities, she states:

The basic claim [of Aristotle's] is that we are political as surely as we are human, and so our social units ought to promote our flourishing as social selves, which in turn creates a stronger *polis*. What would follow from the observation that we are *ecological* beings – 'mere citizens of the biotic community', in Aldo Leopold's words – as surely as we are human? Perhaps social units ought to promote our flourishing as ecological selves, and therefore some degree of flourishing of nonhuman life, in order to create a stronger ecological community.⁴³

In an argument that resembles Sandilands's Arendtian account of human agency as coalitional (discussed in the previous chapter), Cuomo develops such agency further as ecological.⁴⁴

Importantly, Cuomo's model of flourishing finds moral positions for human and non-human organisms in a way that avoids assigning value to the non-human from a human perspective (while, importantly, not eroding human accountability to the non-human). Key to this is not just her analysis of flourishing as a criterion for moral considerability, but her location of the capacity for flourishing in an organism's 'dynamic charm'.⁴⁵ Writes Cuomo, 'it is an entity's *dynamic charm* – its diffuse, "internal" ability to adapt to or resist change, and its unique causal and motivational patterns and character – that renders it morally considerable, and that serves as a primary site for determining what is good for that being or thing'.⁴⁶ Dynamic charm describes a process both unique and intrinsic to an organism, and hence situates its moral value within it rather than in the (human) other. It references not just complexity but the

⁴² Ibid., p. 34.

⁴³ Ibid., p. 69; original emphasis. See also Aldo Leopold, *A Sand County Almanac: With Essays on Conservation*, illustrated edn. (first published 1949; Oxford University Press, 2001) p. 171.

⁴⁴ Sandilands, *Good-Natured Feminist*, pp. 155–62.

⁴⁵ Cuomo, *Feminism and Ecological Communities*, p. 70. ⁴⁶ Ibid., p. 71; original emphasis.

unpredictability and mutability of all living entities in themselves and in interaction with the communities to which they belong.

Thus, Cuomo's conceptualisation of dynamic charm as the basis of moral considerability encompasses both the biocentric and ecocentric (where, as Robin Attfield explains, the ecocentric affords moral considerability to ecosystems or even the biosphere while the biocentric is concerned with individual organisms).⁴⁷ It avoids the holism of a Leopoldian 'land ethic', yet it captures a moral attitude to ecosystems.⁴⁸ Moreover, it is distinct from Nussbaum's extreme biocentric and individualist emphasis on an organism's complexity and sentience. Drawing in part on the work of Jon Moline, Cuomo explains that the idea of dynamic charm:

gives us reason to 'count' some individuals in the moral universe, without committing ethics to promoting the individual interests of protozoa or plants, while still appreciating the value of plants and other members of biotic communities: individual members of 'higher' (sentient, conscious) species are capable of response in ways not exhibited by individual plants, for example, so some sentient animals might be morally valuable as individuals, while plants are only valuable as members of species, populations, or communities.⁴⁹

Aside from the questionability of some of Cuomo's plant/animal boundaries in the light of some startling recent findings in botany (investigations into plant intelligence, for example), her consideration of biotic membership as well as individual sentience allows the moral inclusion of all organisms, without necessarily emphasising non-complex beings as individuals.⁵⁰

Cuomo's ethical framework has two important corollaries for scientific utopianism. First, her invocation of charm is no unquestioning or unscientific account of the mystery of nature, for it acknowledges that a degree of comprehension is crucial to achieving an ethical attitude: 'science and other empirical inquiries can, in theory, give us the kind of information we need to proceed with as much respect as possible with regard to living systems'.⁵¹ After all, scientific comprehension of ecological processes would

⁴⁷ Robin Attfield, *Environmental Ethics: An Overview for the Twenty-First Century*, 2nd edn. (London: Polity, 2014), p. 39.

⁴⁸ Leopold, *Sand County Almanac*, p. 171.

⁴⁹ Cuomo, *Feminism and Ecological Communities*, p. 71; see Jon N. Moline, 'Aldo Leopold and the Moral Community', *Environmental Ethics* 8.3 (1986), 99–120.

⁵⁰ See, for example, Stefano Mancuso and Alessandra Viola, *Brilliant Green: The Surprising History and Science of Plant Intelligence* (Washington, DC: Island Press, 2015), and Anil Ananthaswamy, 'Roots of Consciousness', *New Scientist* 224 (6 December 2014), 34–7.

⁵¹ Cuomo, *Feminism and Ecological Communities*, p. 71.

shed light on the workings and extents of dynamic charm. In this understanding of the relationship of science to wonder, Cuomo productively foreshadows Lisa Sideris's recent defence of the place of wonder (defined differently from Nussbaum's concept of wonder) in scientific investigation; wonder, suggests Sideris, is often accompanied by 'modest habits of mind' – as opposed to celebratory and even hubristic proclamations of science's achievements – and can thus 'encourage deeper reflection on which paths we ought and ought not to pursue'.⁵² 'Genuine wonder', Sideris proposes, 'is the grounding for intellectual virtues and habits of mind'.⁵³

Second, the idea of dynamic charm suggests not only that some organisms have moral worth in and of themselves, but that, for all organisms, moral worth emerges as part of a larger whole; importantly, this whole includes the human and non-human. By its logic, 'nature' is constituted by non-human and human beings, each possessed of an internal dynamic charm but all linked by a mutually constitutive flourishing – or, in the case of humans, by the ethical imperative to participate in such a flourishing. An ecocentric scientific utopianism, one that lends a moral purpose to science, would complement the scientific understanding of the workings of dynamic charm and the ways of flourishing with the impetus to maintain that flourishing.

Flight Behaviour

Kingsolver's treatment of climate change sees a fuller exploration of the need for science to develop a more hopeful and compassionate sense of its responsibility to the future. It effects this through identification with a central character, who bridges two communities – a scientific research group and a rural township – and their two perspectives. This bridging enables the incorporation of science with an ethics of parental care, even as it introduces ecological insights to protagonist and reader. Yet, the human exceptionalism of care threatens to turn this novel into a deeply anthropocentric exercise, in which non-human organisms and their ecological habitats are placed at the eudaemonistic service of humans. Still, the novel, I argue, makes possible an alternative and radically ecocentric reading, in which the flourishing of the non-human is of ultimate significance.

⁵² Lisa H. Sideris, *Consecrating Science: Wonder, Knowledge, and the Natural World* (Oakland, CA: University of California Press, 2017), p. 26.

⁵³ *Ibid.*, p. 27.

Novelist and essayist Kingsolver has enjoyed popular and critical acclaim as a writer of contemporary American life, as well as a reputation as a proponent of a strongly ecological worldview; all her novels – from *The Bean Trees* (1988) onwards – demonstrate the interconnectedness of human and non-human communities. Over the course of her career, she has become ever more committed, as she puts it, to the ‘collaborative survival’ of both human and non-human species; that is, she imagines a future not merely constituted of – but achieved through – ecological cooperation.⁵⁴ Many of her novels are concerned with the struggle of rural families and communities (often with women at their centre), and with the way in which such dramas play out against wider issues of environmentalism. Often setting her narratives in the southern United States (though the African context of her best-known work, *The Poisonwood Bible* of 1998, is a marked departure from this), Kingsolver has increasingly become identified with the Appalachian region.⁵⁵

Her seventh novel, *Flight Behaviour*, brings together all these themes in its story of Dellarobia Turnbow, a young woman living in the deprived agricultural belt of east Tennessee, who unwittingly finds herself at the centre of climate change crisis when its ecological effects unfold in her backyard. Intelligent but undereducated, mother-of-two Dellarobia is trapped in a loveless marriage to the well-meaning but unambitious Cub. The couple live in financial dependence on Cub’s overbearing parents, sheep farmers who are themselves struggling with debt as a result of a precarious side-venture. As the novel opens, Dellarobia is on the verge of throwing away this unfulfilling life for a tryst with a handsome telephone repairman. But, on her way to a rendezvous in a hunting hide on the Turnbow property, she encounters the impressive sight of millions of monarch butterflies in diapause, or hibernation: in this ecologically plausible (though so far, fortunately, unrealised) scenario, the butterflies have been thrown off their migratory path by the increasingly wild weather events wrought by climate change and forced to overwinter in Appalachia rather than their customary destination of the Michoacán highlands in Mexico. The sight of the roosting monarchs not only inspires Dellarobia to return to her family, it is hailed as a miracle by her God-fearing Southern Baptist community and divides the Turnbow family, who had planned to sell their land to loggers in an attempt to evade bankruptcy. It also attracts

⁵⁴ Stephen L. Fisher, ‘Community and Hope: A Conversation’, *Iron Mountain Review* 28 (Spring 2012), 32.

⁵⁵ Robert H. Brinkmeyer, *Remapping Southern Literature: Contemporary Southern Writers and the West* (Athens: University of Georgia Press, 2000), pp. 98–9.

the notice of a scientific team led by an eminent entomologist named Ovid Byron, whose investigations reveal that not only deforestation but the onset of winter could wipe out the entire species, as the planet's unsettled weather patterns have effectively reduced the monarchs to this one eastern migrating population.

The novel's setting is a notoriously conservative and economically disadvantaged region of the United States; its context is the encounter between climate change denialism and the hard evidence of climate change's ecological impact. As Kingsolver has put it, her novel tackles the 'culture war' of climate change where the stakes are highest: 'I live in southern Appalachia . . . the people most affected by climate change already are people among whom I live: rural conservative farmers. And it strikes me that these are the same people who are least prepared to understand and believe in climate change and its causes.'⁵⁶ In the novel, the ideological gulf between the scientists and the locals is focalised through Dellarobia: her assessment is expressed in pithy descriptions of the two sides. In conversation with her sceptical husband, Dellarobia realises: 'Teams had been chosen, and the scientists were not *us*, they were *them*' (231; original emphasis). As she explains it to Ovid, the 'environment got assigned to the other team. Worries like that are not for people like us. So says my husband' (445). The 'teams' that Dellarobia identifies are defined by whether they treat the world as an opportunity for investigation and deductive reasoning or approach it as a matter of faith. The scientific method, captured in Ovid's simple explanation to Dellarobia's son, means that 'a scientist doesn't just make a wild guess. . . . He measures things. He does experiments'; in order to 'discover the truth', scientists 'ask' (164). The townspeople of Feathertown, in contrast, take 'the Word on faith' (83) and are passive consumers of mass media; Cub maintains that 'Weather is the Lord's business' (361). Dellarobia's analysis, as paraphrased by Ovid's folklorist wife, is of a 'territorial divide' (543) that only deepens as markers of difference reflexively shape identity.

Dellarobia is able to evaluate this divide, for both herself and her reader, because she is able to cross it. Born and raised in Feathertown, she is also possessed of a scientific mind, what Ovid calls 'a talent for this endeavour' (392). It is Dellarobia, who, for example, finds that she alone of the Turnbow family is capable of understanding the behaviour of sheep by dint of attentive observation, that is, by her commitment to the deductive reasoning that defines the scientific method. Set apart from her community

⁵⁶ Bryan Walsh, 'Barbara Kingsolver on *Flight Behavior*', *Time* (8 November 2012).

by her inherent inquisitiveness – she recalls being kicked out of Bible class for ‘her many questions’ (83) – Dellarobia feels inexplicably at ease with the scientists when she starts helping them. She thus not only straddles the two communities; she facilitates the reader’s sympathy with both sides, as she expresses this sympathy herself. Indeed, as Axel Goodbody points out, Kingsolver depicts conservative denialism ‘with sympathy and understanding’.⁵⁷ Dellarobia realises that Cub’s annoying habit of channel surfing, which she derides as ‘ADHD TV’ (154), echoes a wider community strategy of ignoring bad news: ‘If people played their channels right, they could be spared from disagreement for the length of their natural lives’ (357). This is an understandable response, Goodbody reminds us, from a marginalised and underprivileged people who inhabit ‘a world over which they have little control’ and who therefore seek to ‘avoid confrontation with inconvenient truths’.⁵⁸ At the same time, as the scientists interact with Dellarobia, they command sympathy too: ‘We are scientists. Our job here is only to describe what exists’, Ovid explains, ‘But we are also human. We like these butterflies, you know?’ (204). Moreover, his deep grief at their impending extinction – expressed in Dellarobia’s realisation that ‘the one thing most beloved to him was dying’ (315) – reveals that, for all their earnestly spouted dispassion, the research team, particularly Ovid, are motivated by something like love for the butterflies.

While Dellarobia fulfils an important intermediary function for the reader (not to mention for other characters in the novel), she also, importantly, transforms into an apprentice ecologist over the course of the narrative. The novel is, as commentators have noted, her *Bildungsroman*.⁵⁹ Dellarobia becomes Ovid’s research assistant, and eventually separates from Cub and enrolls on a college degree with the intention of becoming ‘Some kind of scientist’ (587); that her scientific awakening constitutes a kind of rebirth is even implied by the internet meme brought

⁵⁷ Axel Goodbody, ‘Risk, Denial and Narrative Form in Climate Change Fiction: Barbara Kingsolver’s *Flight Behavior* and Ilija Trojanow’s *Melting Ice*’, in Sylvia Mayer and Alexa Weik von Mossner (eds.), *The Anticipation of Catastrophe: Environmental Risk in North American Literature and Culture* (Heidelberg: Universitätsverlag Winter, 2014), p. 50.

⁵⁸ *Ibid.*, pp. 50–1.

⁵⁹ Sylvia Mayer, ‘Explorations of the Controversially Real: Risk, the Climate Change Novel, and the Narrative of Anticipation’, in Mayer and Alexa Weik von Mossner (eds.), *The Anticipation of Catastrophe: Environmental Risk in North American Literature and Culture* (Heidelberg: Universitätsverlag Winter, 2014), p. 30. However, Linda Wagner-Martin’s analysis of the novel as *Bildungsroman* concludes – not entirely convincingly – that Dellarobia does not develop and that even ‘her personal thirst for knowledge’ is ‘given to her’ by Ovid; Wagner-Martin, *Barbara Kingsolver’s World: Nature, Art, and the Twenty-First Century* (New York: Bloomsbury, 2014), pp. 196–7.

about by the brief media interest in her story – Photoshopped onto Botticelli’s famous painting, Dellarobia becomes ‘the Butterfly Venus’ (294). Dellarobia’s entry into the scientific community has several ramifications. First, it enables the relaying of scientific information from Ovid to Dellarobia and sometimes her son, and from Dellarobia to friends and family, not to mention to the reader; these ecological findings reveal both the dynamic charm of the monarch butterflies and the damage being done to their ability to flourish. As Ovid explains, the monarchs perform several long migrations over the course of a year: hatched in Canada, they winter in Mexico because of their vulnerability to the cold; they then fly north to Texas for the milkweed plants that are their larval food; the hatched caterpillars journey further north, repeating the process, till three spring generations have fed and migrated northwards; then, after this, the third generation flies to Mexico to winter and repeat the process. The butterflies possess a complexity that gives them dynamic charm. And, not only are the distance and pattern of migration impressive, but the question of how successive generations are able to return to the very same trees as previous ones, never having been there, is a mystery or, to invoke Nussbaum, an object of wonder. It is not, however, any individual butterfly but the butterflies as a ‘complicated system’ (200) that warrants such wonder. What Dellarobia also learns, however, is that the wonder of their migration has been disrupted by human destruction of the environment, a disruption that could spell the death of this particular population and the near extinction of the species.

Furthermore, Dellarobia’s initiation into science is not just a journey of discovery for her; it allows her to bring something of her own to the scientific endeavour. This something is the exercise of parental care. Dellarobia’s experience of parenting is depicted as consumed by anxiety about her children’s limited future: living a subsistence existence, she finds herself refraining from ‘counting on things being fine. Meaning her now-living children and their future, those things’ (320). Ovid’s concerns for the future of the butterflies are focalised through Dellarobia as a luxury in contrast with the ‘real’ fears of a parent whose children’s future seems hopeless: ‘If Ovid Byron was torn up over butterflies, he should see how it felt to look past a child’s baby teeth into this future world he claimed was falling apart’ (320). Eventually, however, her concerns become a heightened version of Ovid’s, a fear for the loss of the future for the sake of her son: ‘Dellarobia felt an entirely new form of panic as she watched her son love nature so expectantly, wondering if he might be racing toward a future like some complicated sand castle that was

crumbling under the tide' (341). That is, Dellarobia combines her experience of poverty-stricken parenthood with her new ecological understanding of the threatened global environment into a very particular view of posterity.

Dellarobia – and the reader with her – develops an enhanced understanding of the future predicated on parental care. More than that, Dellarobia specifically employs this to redress what she comes to see as the shortcoming of science: its objectivity. In a pivotal conversation between Ovid and Dellarobia, the 'febrile biosphere' is brought into the same frame as a sick child. Ovid compares the warming planet to a child developing a fever: a small change of two degrees creates 'a low-grade fever' that makes Dellarobia think of her 'children's cheeks hot to the touch, their racked sobs that wrenched her will for living' (386); with a further rise of two and a half degrees, Dellarobia would 'head for the emergency room' (386). As Ovid reveals, these are the same temperature rises that create the grim scenario of the latest report from the Intergovernmental Panel for Climate Change; thus 'we are headed for the ER' (386). Moreover, Ovid compares the seemingly invisible phenomenon of climate change to the growth of a child: "A trend is intangible, but real," he said calmly, "A photo cannot prove a child is growing, but several of them show change over time. Align them, and you can reliably predict what is coming . . ." (387). Thus, imagining the climate-changed future should be no less difficult than imagining 'Your children's adulthood' (389). It would seem that what is being asked for is the response of a caring parent. Importantly, Dellarobia takes this further, and translates parental care into an ethical stance based primarily on hope. She concludes to Ovid, 'I'm not saying I *don't* believe you, I'm saying I *can't*' (392; original emphasis). Misunderstanding this as a statement of intellectual rather than ethical or psychological inability, Ovid praises her talent for science but warns, 'For scientists, reality is not optional' (392). Yet, Dellarobia continues to express 'hope': 'Are we at least allowed to hope that the butterflies will make it through this winter?' (392). Later, she objects to his pessimism, 'Don't say that, "too late." I hate that. I've got my kids to think about' (443). Where Robinson presents a utopian view of a science of compassionate Buddhist enlightenment, Kingsolver's novel, through Dellarobia, seems to suggest that science should be imbued with parental hope and care: as Goodbody puts it, Dellarobia comes to possess a 'blend of cognitive knowledge, ethical commitment

to future generations, and faith in the ability of people to change things'.⁶⁰

At this point, the novel's scientific utopianism is capable of offering either an anthropocentric or ecocentric account of posterity. That is, on the one hand, it is concerned with the biosphere and the butterflies that represent it synecdochically for the sake of human well-being, and, in comparing responsibility to the biosphere to parental obligations to children, it implies that this is where the ethical response lies; on the other hand, however, the butterflies exhibit a dynamic charm in and of themselves. Much, then, depends on the narrative's treatment of the butterflies and, particularly, of their future relative to human futures.

On one reading, the butterflies act as pointers to Dellarobia's identity, particularly, her maternal identity. She is aligned with the bright orange monarchs not just by her 'flame-coloured hair' (1), but by her recurring need for a 'flight path' out of her narrow life.⁶¹ The colour of the butterflies also brings to mind Dellarobia's first child, stillborn with a 'fine hair all over its body that was red like hers' (14), who is further united with the butterflies as something to be mourned 'while most people paid no attention' (316). Dellarobia explicitly connects this baby with the butterflies, thanks to the poignant Mexican belief that the monarchs are the souls of dead children; she tells Preston that 'one of those [butterflies] is ours' (583). This belief links Dellarobia's first child with the unfortunate Michoacán children who have been killed in mudslides caused by excessive rainfall and deforestation. It thus identifies the butterflies with all children, including Dellarobia's surviving children, and potentially, with children of the future. Whether this aligns the monarchs with future children in an expression of hope (since Dellarobia herself, identifiable with the butterflies, has a hopeful future ahead of her) or as potential victims of climate change and other anthropogenic environmental crises is a moot point. What is clear, on this reading, is that the monarchs are enablers of a human story of loss, determination, and hope.

At the same time, the butterflies, in the novel's ecological explanations, are shown to possess a charm and complexity unknown to and seemingly aloof from humans; indeed, they represent an ability to flourish that is oddly superior to that of humans'. The 'complicated system' (200) of monarchs elucidated by Ovid is, after all, a compressed statement of intergenerational dynamics; because it lives only six weeks, no single

⁶⁰ Goodbody, 'Risk, Denial and Narrative Form', p. 48.

⁶¹ Wagner-Martin, *Barbara Kingsolver's World*, p. 4.

monarch makes the annual migration from Mexico to Canada and back, which must thus occur in several generational stages. What the monarch provides in the novel, then, is an ironic comment on humanity: the monarch trajectory, one species' elegant exercise in intergenerational cooperation, stands in stark contrast to humans' failure to maintain such cooperation themselves. That the monarch is also in danger of being extinguished by humans' failure has the potential to render that contrast tragic.

The narrative's conclusion holds the novel's two possibilities – the anthropocentric and the ecocentric – in delicate balance. Dellarobia separates from her well-meaning but ineffectual husband, enrolls into college, and encourages her son to follow in her footsteps, all of which promises to end the novel on a deeply anthropocentric note of scientific utopianism. Such a *dénouement* would turn the fate of the monarchs into a metaphor for a happy ending of human triumph. Yet, something very different – and potentially profoundly ecocentric – happens instead. The freakishly wet and snowy weather that has dominated the narrative from the outset results in unprecedented flooding across the county, as wild weather events occur throughout the world. As the waters rise around her home, Dellarobia is alone: her children are at school or with her in-laws. Thus, she takes in the enormity of the situation alone and with a sense of fascinated calm: 'She comprehended the terms of what she saw, but couldn't turn away from it' (594). She witnesses the butterflies emerge from their hibernation, for the monarchs, it seems, have survived in sufficient numbers to recommence their migration for now. Yet, the reader is ignorant of whether or not Dellarobia, on the brink of embarking on her own journey, will also manage to take flight, and, indeed, it seems likely that the novel ends with her impending death or, at the very least, the devastation of both the life that she has and the new one she anticipates. It seems, then, that she is witness to the environmental disaster that will lead to her destruction, on the one hand, and the awakening of the butterflies in a miraculous survival for this remnant of the species, on the other.

The novel's ending has puzzled commentators. According to Sylvia Mayer, it 'can be ambiguously read: either as a sign of destruction, or as a sign of cleansing and renewal'.⁶² That depends, indeed, on whether one's empathy and sympathy stay with Dellarobia or shift entirely to the butterflies (when, up till now, attention had been directed at the butterflies through sympathy with Dellarobia). Curiously, readers on both sides

⁶² Mayer, 'Explorations of the Controversially Real', p. 31.

have mistaken this, for different reasons, as a tragic ending. In Linda Wagner-Martin's anthropocentric reading, the monarchs and Dellarobia are all doomed, so that this 'last irretrievable chapter' shows that 'Dellarobia, like the butterflies, has no more choices'.⁶³ Meanwhile, Clark seeks, but does not find, an ecocentric reading; elsewhere so keen to examine Anthropocene novels for the possibility of a scalar shift away from the human, he interprets this novel's conclusion as one in which Dellarobia survives, and in which the butterflies 'have come almost entirely to symbolize a positive turning point in one character's life', a symptom of the novel's tendency to engage the reader in an 'individualizing way'.⁶⁴ He particularly opines that 'a pointed *disjunction* between the individual character's story and the fate of the insects would have made the text more provocative as a climate change novel . . . the survival of the butterflies could have been juxtaposed with some personal defeat or resignation'.⁶⁵ And yet, such a disjunction is precisely what has happened, for there occurs a significant 'defeat' of some kind for Dellarobia; thus, the novel does indeed end with a provocative version of the future in ecocentric terms. The fate of the monarchs, that is, takes precedence over any eudaemonistic investment in or by Dellarobia.

Such misapprehension on Clark's part, however, is telling, for it has to do with the novel's destabilisation of identification and empathy at this point, specifically, the abruptness of the turn away from Dellarobia as the facilitator of an overwhelmingly conservative and conventional set of readerly sympathies and parental ethics, towards a distinctly unconventional and radical kind of posterity. The novel shocks the reader out of an emotional connection with Dellarobia. So much is this so that it ends on a note of emotionlessness. Dellarobia's response to her impending death involves neither alarm and therefore disaster and tragedy, nor sadness and with it melancholy and lament. This is not the tragic spectatorship demanded by a eudaemonistic reading; it is, rather, a critically reflective spectatorship in appreciation of the monarchs' flourishing.

Kingsolver's novel facilitates what Robinson's scientific utopianism fails to achieve: the ultimate reversal of what Nussbaum, after Frans de Waal, calls 'anthropodenial', that is, the wilful denial of our animality and the arrogant claim to human transcendence.⁶⁶ With the monarchs' survival, it is less that we progress towards a tragic sympathetic understanding of our

⁶³ Wagner-Martin, *Barbara Kingsolver's World*, p. 197. ⁶⁴ Clark, *Ecocriticism on the Edge*, p. 177.

⁶⁵ *Ibid.*, p. 178; original emphasis.

⁶⁶ Nussbaum, *Political Emotions: Why Love Matters for Justice* (Cambridge, MA: Belknap Press, 2013), p. 184.

embeddedness in the biosphere and more that we are dropped abruptly into the revelation of the insignificance of our place within it. The reader is effectively displaced from the insects' ecosystem, but, at the same time, called on to inhabit the same moral universe, thanks to their inherent dynamic charm.