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Reading the Anthropocene Through Science and Apocalypse in the Selected Contemporary Fiction of J G Ballard, Kurt Vonnegut, Cormac McCarthy and Ian McEwan

by

David William Fevyer

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ABSTRACT

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READING THE ANTHROPOCENE THROUGH SCIENCE AND APOCALYPSE IN THE SELECTED CONTEMPORARY FICTION OF J G BALLARD, KURT VONNEGUT, CORMAC MCCARTHY AND IAN MCEWAN

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This thesis examines how six contemporary novels variously intervene in the current crisis of climate change. Through close readings of J G Ballard's *The Drowned World* (1962) and *Hello America* (1981); Cormac McCarthy's *The Road* (2006); Kurt Vonnegut's *Cat's Cradle* (1963) and *Galapagos* (1985); and Ian McEwan's *Solar* (2010), the thesis aims to identify how the narrative and generic resources of contemporary fiction might help readers to think through and beyond the consequences of anthropocentric ways of thinking about the biosphere. Drawing upon the concept of the Anthropocene – and in particular the account of this concept provided by the historian Dipesh Chakrabarty – the thesis suggests that these novels raise profound questions about how climate change is represented and understood. If accounts of the human history of modernity have until recently overlooked the complex ways in which both the human species and its contemporary fossil fuel cultures are intertwined with the geologic history of the planet, how has contemporary fiction attended to this oversight? What light can imaginative apocalyptic future histories of the biosphere, such as those presented in the fiction of Ballard, Vonnegut and McCarthy, shed on predominant understandings of climate change? How has fiction highlighted the ways in which the insights offered by the Anthropocene complicate the promises of scientific 'reason' to explain and provide solutions to anthropogenic climate change? How do fictions such as those of Vonnegut and McEwan contribute to a more nuanced account of the limits of such reasoning? To address these questions, the thesis draws upon Martin Heidegger's account of the anthropocentric enframing of nature through technology, and suggests a re-thinking of Louis Althusser's account of ideology through which we can begin to understand how anthropocentric perspectives are naturalised in ways that illuminate some of the difficulties identified by Chakrabarty. By bringing these three perspectives together, the thesis seeks to develop a distinct critical approach to reading the responses of these literary fictions to climate change.

The first section of the thesis examines how the generic resources of apocalyptic fiction defamiliarise assumed relationships between the human subjects and societies of industrial modernity and the biosphere. Chapter 1 suggests that J G Ballard's novel *The Drowned World* (1962) imaginatively connects geologic and human history in order to disrupt key anthropocentric assumptions concerning the relationship between humanity and the biosphere, whilst his later novel *Hello America* (1981) foregrounds the anthropocentric inscription of industrial modernity through a self-consciously hallucinatory re-imagining of American history. Chapter 2 examines Cormac McCarthy's recent novel *The Road* (2006), and suggests that the text presents a particular form of apocalyptic narrative that complicates the anthropocentric sub-text of traditional apocalyptic narratives.

The second section of the thesis examines how the fictional representation of science and scientists can help to illuminate the ways in which an anthropocentric faith in the technoscientific promise of human power over nature serves to legitimate an illusion of human mastery over the biosphere. Chapter 3 considers how Kurt Vonnegut's novel *Cat's Cradle* (1963) offers a counterpoint to this faith by ironically depicting scientist characters whose assumptions of beneficial technoscientific progress are undermined by complex interconnections between individuals and the biosphere – connections that have apocalyptic consequences. Such complex interactions are also a feature of the insights offered by ecology and evolutionary science. Reading Vonnegut's fiction after the Anthropocene underlines the ways in which Vonnegut's literary techniques can help readers to think through and beyond the complex connections between natural and human history that these scientific disciplines begin to elucidate. As chapter 3 suggests, Vonnegut's later novel *Galapagos* (1985) provides a particularly imaginative account of this

complexity through its fictional narrative of an evolutionary future history across the *longue durée* of geologic time.

Building on the insights developed in chapter 3, chapter 4 considers the significance of Ian McEwan's ironic depiction of a fictional scientist who is unable to restrain his own overconsumption of resources in his novel *Solar* (2010). In my reading, McEwan's scientist figure functions as an allegory for the paradoxes of a technoscientific culture that seems unable to apply scientific reason in meaningful responses to the dangers of the Anthropocene. In so doing, the chapter illustrates how the use of allegorical codes and irony in *Solar* draw attention to the ways in which a faith in technoscientific reason to provide solutions to anthropogenic climate change is misplaced. This misplaced faith also naturalises the on-going enframing of nature as a resource, with potentially apocalyptic consequences.

The apocalyptic narratives of the Ballard and McCarthy novels can be understood as quasi-scientific literary speculations, which disrupt anthropocentric assumptions through the experimental futures they depict. Similarly, the ironic depictions of scientists and scientific thinking in the Vonnegut and McEwan novels draw attention to the anthropocentric limitations of conventional scientific thinking for fully understanding and productively responding to the apocalyptic implications of climate change. In bringing these readings together, the thesis attempts to provide valuable and timely insights into the techniques through which the literary fiction of Ballard, Vonnegut, McCarthy and McEwan can help readers to think differently about the complex relationship between human life and the biosphere. These readings also trace how such fiction can draw attention to the ways in which anthropocentric patterns of thought contribute to the catastrophic climatic implications of technoscientific culture.

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DECLARATION OF AUTHORSHIP

I, David William Fevyer .....

declare that this thesis and the work presented in it are my own and has been generated by me as the result of my own original research.

Reading the Anthropocene Through Science and Apocalypse in the Selected Contemporary Fiction of J G Ballard, Kurt Vonnegut, Cormac McCarthy and Ian McEwan

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I confirm that:

1. This work was done wholly or mainly while in candidature for a research degree at this University;
2. Where any part of this thesis has previously been submitted for a degree or any other qualification at this University or any other institution, this has been clearly stated;
3. Where I have consulted the published work of others, this is always clearly attributed;
4. Where I have quoted from the work of others, the source is always given. With the exception of such quotations, this thesis is entirely my own work;
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6. Where the thesis is based on work done by myself jointly with others, I have made clear exactly what was done by others and what I have contributed myself;
7. None of this work has been published before submission

Signed: .....

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Introduction

> *[…] it was all Man [sic] could do to exist. No initiative could be taken. The lord of creation was beaten to his knees by his environment, the environment that for the previous fifty years he had prided himself on being able to control.*[1]

This is a passage from the 1957 novel *The Black Cloud*, written by the astronomer and cosmologist Fred Hoyle. It is also a summary of the novel's premise, in which an alien life form – the eponymous 'black cloud' – approaches the Earth and disrupts both the environment itself, and a supposed human mastery over that environment. But this passage could also quite easily serve as a summary of the premise of the 2004 Hollywood movie *The Day After Tomorrow*, [2] which was directed by Roland Emmerich. Forty-seven years separate these two narratives. The novel was written by a scientist better known for opposing the theory of the Big Bang, whilst the film was directed by a filmmaker known for big budget blockbusters that mobilise spectacular special effects to evoke threats to civilisation such as alien invasion,[3] mutant lizards,[4] and Mayan prophesy.[5] Yet both narratives relate a speculative account of impending global catastrophe wrought by the disruption of the planetary climate,[6] in which the power of human civilisation to exploit and exert control over the biosphere is threatened.

Significantly, both *The Black Cloud* and *The Day After Tomorrow* offer these accounts through graphic depictions of the apocalyptic transformation of the environment and the prominent representation of science and scientists. In doing so, both emphasise how the humans they depict are vulnerable to changes in the biosphere of the Earth, despite the accelerating technoscientific development of the societies that they inhabit. Indeed, the climate crises of both fictions can be understood as threats to an established relationship between human civilisation, represented by the fictional characters depicted in these stories, and a biosphere upon which those characters' biological life depends. Yet in presenting these threats, the depictions of climate change in both fictions can also be understood as reproducing an assumed exploitative relationship with an objectified biosphere; it is the technoscientific resolution of the crises and the restoration of this relationship that unites the outcomes of both plots. In this sense, both fictions present essentially conventional formulations of the human-biosphere relationship itself, in which the human subject ultimately emerges triumphant. Indeed, the recuperation of human power over nature in these fictions – and others[7] – is suggestive of a faith in a limitless and legitimate capacity for human technoscience to intervene in and exploit the biosphere.

In this thesis I identify six works of literary fiction that challenge that faith. Through a close reading of each text I examine how literary fiction can work to disrupt conventional formulations of the human-biosphere relationship, and in doing so serve to intrude upon specific and dominant ways of thinking through which the contemporary crisis of climate change is understood. In conducting this analysis I develop a critical vocabulary for describing how literary fiction can help us to think through different ways of understanding the relationship between humans and the biosphere. These different ways of thinking question both the assumed legitimacy of seeking to exploit nature as an infinite resource, and the artificial separation of the human and the biosphere that this assumption perpetuates. This vocabulary draws upon several key theoretical perspectives, and rethinks these concepts in light of the readings themselves.

The Monster of the Moment

Before proceeding to these perspectives and texts themselves, however, it is useful to examine more closely the ways in which some depictions of apocalypse and science have tended to reproduce a conventional formulation of the relationship between humans and biosphere outlined above. *The Day After Tomorrow* provides an instructive example of this tendency. Whilst the film appears to reflect what Karen Pinkus has called 'our very recent collective consciousness'[8] of climate change, Timothy Clark cites it as an example of a fiction 'falling back on the tired formulae of urban disasters and apocalyptic scenarios' that he compares tellingly to a 'variety of the alien invasion film'.[9] This view casts the film as part of a tradition of what we might term 'monster of the moment' Hollywood films, in which the same basic structural elements, such as the hero scientist characters that recur throughout Emmerich's films,[10] are recycled in order to produce what Clark suggests is the very same logic of 'narcissistic individualism' that is itself implicated in 'consumer democracy and environmental danger'.[11] The film certainly appeals to this logic through familiar narrative elements: as well as the hero scientist character of Jack Hall, we find the routine suspicion of self-interested politicians; the value of technoscientific gadgetry in detecting the threat; sub-plots that reaffirm family values and the stoic dedication to duty; and even a secular version of a salvation narrative re-imagined through science, which I examine further in Chapter 2 of this thesis. In this sense, whilst *The Day After Tomorrow* might be understood as a film ostensibly about the threat of climate change, it only makes sense of that threat by re-imagining it through familiar mass culture genre conventions that fulfil the expectations of mainstream audiences. By doing so, the film attests that climate change can be contained by the same existing modes of technoscientific knowledge production, heroic endeavour, and commitment to existing ideals that are relayed through the 'tired formulae' identified by Clark. In this way, the film's apocalyptic depiction of climate change serves merely as

a contemporary backdrop through which the film suspends disbelief during the experience of watching it. This depiction does not challenge audiences to consider the implications of climate change in their own relationship with the biosphere.

Indeed, in foregrounding the hero scientist as saviour, the film actively reproduces a fundamental assumption about this relationship that recent analyses of the implications of climate change itself suggest we must re-think. Jack's heroic status as scientist rests upon his ability to treat the climate change depicted in the film as an object of scientific enquiry. This treatment casts the biosphere as a discrete object of consideration exterior to the human subject (Jack) who is assumed to merely inhabit it. This biosphere-as-object acts upon the human subject in a way recently described by Bruno Latour in reference to James Lovelock and Lynne Margulis' Gaia hypothesis as a 'causal force'.[12] Such forces are always exterior to the human subject, which Latour calls an 'impenetrable' entity that is imagined as inhabiting the biosphere rather than existing through and with it. This insight is useful for analysing how the biosphere is depicted in fiction, because it highlights the tendency of a film such as *The Day After Tomorrow* to mobilise the biosphere as a 'causal force' in a plot that is actually about conventional interactions between human characters. The biosphere's role as a 'causal force' is particularly apparent in the way that the film signals the start of its apocalyptic narrative through the abstracted scientific analysis of Northern Atlantic sea-temperatures. This change in the biosphere serves mainly to intensify Jack's on-going conflict with the politicians, so that the biosphere itself appears as a somewhat abstracted cause of the conflicts and adventures that follow. Even later in the film, when Jack encounters the environmental changes first-hand in the numerous scenes of him battling with snow and ice, the biosphere features as a cause of peril that merely provides a means of establishing Jack's heroic credentials in his quest to save his son. Through the positioning of the biosphere as an external 'causal force' in the relationship between Jack and the fictional world he inhabits, the biosphere is rendered as a separate object.

Such a rendering of Jack as subject and environment as object is suggestive of a traditional assumption of the relationship between humans and the biosphere that has recently been subjected to critique by commentators such as Isabelle Stengers and Donna Haraway. Haraway in particular has emphasised the importance of understanding the human subject as an entity that has 'become with' other organisms in a complex process of co-creation.[13] This 'becoming with' suggests a way of thinking about 'the biosphere' more as a domain that co-creates and is co-created by interconnected organisms – including human organisms – than as a discrete object. Such a perspective challenges the objectification of the biosphere, and complicates both the agency and assumed legitimacy of the human subject to exert power over that biosphere. It is challenges such as this to traditional assumptions of the human-biosphere

relationship that are taken up in the literary fictions examined in this thesis, as my close analysis of these texts in the following chapters demonstrates.

The Day After Tomorrow however follows in a tradition of relating scientist characters to the spatial and temporal environments they inhabit that is also readily identifiable in *The Black Cloud*. Whilst Hoyle's book was published decades before our current awareness of climate change, its emphasis on the vulnerability of human populations to even small climate changes suggests a relationship with the biosphere imagined in terms of subject and object. The grim diagnosis of one character encapsulates this view: 'Man'll [*sic*] have to come to terms with his environment. And I guess the terms won't be altogether to his liking.'[14] This statement could almost serve as a motto for the era of climate change in which the stability of industrial modernity is challenged by those changes. It is precisely these conditions of industrial modernity that are – in the West at least – implied to be to humanity's 'liking'. But this statement also clearly positions the 'environment' as the object from which 'Man' draws that which is 'to his liking', in a relationship of objectifying exploitation. 'Man' is not an integrated part of this environment, but an owner-occupant.

Indeed, alongside the apparent prescience of the above statement, *The Black Cloud* might also be read in terms of the same 'heroic' framing of scientists that we find later in *The Day After Tomorrow*. This is not merely an idealised vision of how a scientist can save the day; it attests to the need for everyone to participate in rationally 'coming to terms' with what we might now describe after Latour as the 'causal force' of the changing biosphere. This valorising of the scientist's role in containing the effects of the changing biosphere for the benefit of some 'impenetrable' – and suspiciously universal – human subject is apparent in much of the conflict between some of the novel's scientist characters and politicians. Like *The Day After Tomorrow*, the resolution of these conflicts subsists in the eventual instrumentalising of the scientist's knowledge claims as a means of intervening in the apocalyptic changes being wrought upon the biosphere. But in playing-out this resolution, both fictions reproduce a faith in the possibility of exerting human power over an objectified biosphere that simultaneously elides the non-scientific choices that direct such intervention. Such a faith is clearly questioned by the critical and philosophical perspective of Donna Haraway and others referred to above.

What Is the trouble?: Fiction in The Era of Climate Change

Does climate change then require a different way of thinking about the human relationship with the biosphere? And if so, how might literary fiction help readers to think through this relationship in new and productive ways? Environmental crises have long suggested a need to think differently about the human relationship with the biosphere. Margaret Atwood for example has recently

highlighted how the 'enormous' impact of Rachel Carson's work of popular science – *Silent Spring* (1962) – lay in the way that it challenged existing assumptions and patterns of thought that valorised 'scientific innovation' and 'progress' in the technoscientific exploitation of the biosphere.[15] But whilst literary fiction does not challenge these assumptions in the same way as popular science writing, it is the core premise of this thesis that such fiction can mobilise specific literary techniques in order to disrupt some of the ways of thinking that are implicated in climate change, or what Donna Haraway has recently referred to as 'the trouble'.[16] Before we can begin to examine these specific literary techniques however, we must first identify more precisely what ways of thinking underpin the 'trouble' of climate change, and what different ways of thinking are necessary in order to begin to understand and respond to it.

Enter the Anthropocene: Imagining Humans in the Biosphere

When we talk about the era or current crisis of climate change, we mean of course a specifically anthropogenic climate change. But this distinction of the '*anthropos*' carries more significance than is necessarily obvious beyond the general sense that human activity is the cause of much of the material change being observed in the contemporary global climate. To say that humans 'cause' anthropogenic climate change is too simple a statement. It overlooks the many ways in which this cause takes form, both in terms of the historical emergence of anthropogenic climate change as a phenomena to be understood scientifically, and in terms of how we understand it as a social or cultural phenomena within an increasingly globalised yet unequal industrial economy. These factors are also entwined with questions of how we understand ourselves as individual biological entities in relation to the biosphere and each other. The concept that I propose to utilise in order to better approach how this complex sense of living in the era of anthropogenic climate change is reflected and debated in fiction is the Anthropocene.

The Anthropocene is a term originally credited to the marine biologist Eugene F. Stoermer and popularised in its current usage by atmospheric chemist Paul J. Crutzen.[17] The term essentially proposes that the current epoch of geologic history is characterised in the geologic record by the effect of human activity upon the planet. This marking of geological history renders the impact of human activity as comparable in scale to other global and epoch-defining impacts such as the end of the last period of glaciation that marked the end of the Pleistocene and was associated with the extinction of many species of megafauna. Indeed, William F. Ruddiman suggests that the Anthropocene is in part defined by activity that has delayed the next period of glaciation.[18] The Anthropocene therefore illuminates our understanding of anthropogenic climate change by powerfully articulating the spatial and historical scale of human influence upon the biosphere.

Clearly the Anthropocene has emerged as a convenient scientific term for expressing the overall effect of a series of observed phenomena, although there remains considerable scientific disagreement concerning the scientific definition of this era,[19] and also when it began.[20] But as a means of conceptualising a different way of thinking about humans and the biosphere in light of anthropogenic climate change, the term has increasingly found use in contexts beyond those of its scientific origins, including in literary criticism. In 2008, when I began research for this thesis, the term was still largely limited to the sciences. In 2012, when an article entitled 'Death and the Anthropocene: Cormac McCarthy's World of Unliving' appeared in the journal *The Oxford Literary Review*, the author, Louise Squire, summarised the concept in a single sentence.[21] In the introduction to a 2013 issue of the journal *diacritics* dedicated to 'Climate Change Criticism', Guest Editor Karen Pinkus refers to the Anthropocene without the need for further explanation or definition.[22] In May 2015, two books – Adam Trexler's literary analysis *Anthropocene Fictions*[23] and a Routledge Anthology of the Anthropocene in the Humanities[24] – were published.

As a concept then, the Anthropocene has obtained considerable critical currency during the period in which this thesis was being developed. But in doing so, the term has also encountered critical opposition. The philosopher Isabelle Stengers has described the concept as 'highly questionable',[25] a concern she expresses with her question 'who is *anthropos*?'[26] By asking this question, Stengers draws attention to the danger of species thinking; the risk that viewing the Anthropocene as the story of a singular and essential '*anthropos*' ignores the many contingencies of history – in particular those implicated in gendered, racial, and cultural inequality – through which industrial modernity has emerged to accelerate anthropogenic climate change. This criticism is reflected elsewhere. The Human ecologists Andreas Malm and Alf Hornborg, for example, have recently critiqued what they describe as the 'Anthropocene narrative', which they view as a portrayal of anthropogenic climate change as an inevitable consequence of human evolution.[27] Like Stengers, Malm and Hornborg are suspicious of the universalising implications of the Anthropocene, and detail the ways in which it obscures the global inequalities that have attended industrialisation and the emergence of the fossil fuel economy. In a similar vein, commentators such as Donna Haraway[28] and Slavoj Žižek,[29] have drawn particular attention to the necessity of understanding the history of anthropogenic climate change – which the Anthropocene claims to encompass – as part of the history of capital. This emphasis on capital is important because it reminds us that anthropogenic climate change is driven by those same industrial processes of modernity that globally manifest capitalism. As a consequence of this emphasis, the alternative term 'Capitalocene' has been proposed by Haraway and others as a way of properly accounting for the current era as one defined specifically by capital, rather than one defined by what might otherwise appear to be a universal and ahistorical claim of the human.[30]

These critiques of the Anthropocene are powerful and timely, and form part of an on-going debate. But they are also responses to what is still a relatively new concept that carries multiple, contested – and sometimes contradictory – implications. When, as noted above, even the scientific definition of the term is highly provisional, it is not easy to draw absolute conclusions about what the concept includes or excludes. It is, for example, much easier to relate the Anthropocene to the history of capital if one aligns the beginning of the Anthropocene with the invention of the stream engine, as Crutzen and Stoermer do.[31] But competing accounts of when the Anthropocene began, such as that proposed in William F. Ruddiman's account of a 'long' Anthropocene,[32] complicate this type of analysis. Indeed, the Anthropocene is potentially a much more complex and nuanced concept than some of its critics allow for. For example, whilst Malm and Hornborg rightly draw attention to the global inequalities and imperialist actions that mark the emergence and perpetuation of the fossil fuel economy, their critique tends to emphasise a binary opposition between a small global elite acting as the principle causative factor in anthropogenic climate change, and the large numbers of people who take no part in this use of fossil fuels yet who are subject to its consequences. Although underlining the scale of global inequality that anthropogenic climate change itself exacerbates, this critique also tends to ignore the many complex and varied levels of participation in and around the functioning of industrial modernity that fall outside of these binary positions. In particular such a binary analysis leaves relatively undisturbed the millions of subjects of industrial modernity who appear to willingly participate in the daily activities that drive the crisis. Without accounting for this active and collective – if not universal – participation, it is not possible to begin to understand how and why it is maintained.

Similarly, the criticism of the Anthropocene implied by the concept of the Capitalocene does not fully account for the extent to which the emergence of capital was itself part of a longer history in which environmental conditions – which is to say the history of the climate – played and continue to play an essential part.[33] Without such an account, capital simply becomes the master narrative to which all else, including the biosphere, is always already subject. This narrative itself potentially recapitulates the unexamined assumptions behind the worn aphorism that '[it's] the economy, stupid!',[34] and in so doing resists the more recent and productive claim of environmentalists that 'it's the environment, stupid!'. Being mindful of the complex and interdependent relationship between the history of capital and climate history is therefore necessary in order to avoid a particular form of anthropocentric thinking in which the global economy is always the largest possible frame of reference.

This brief discussion of recent critiques of the Anthropocene is by no means exhaustive,[35] but it does underline the extent to which the concept is contested in ways that reveal many of the underlying assumptions – of scientists and critics alike – that shape our understanding of the how

and the why of anthropogenic climate change. The open questions thrown up by recent debates surrounding the Anthropocene powerfully attest to the need to re-examine some of these assumptions, and in doing so to think differently about the human relationship with the biosphere. Indeed, it is the very contestability of the concept of the Anthropocene that makes it useful for working through some of the implications of anthropogenic climate change; such difficulties as those discussed above call attention to the need to think differently.

We can see then that the philosophers, historians, and scientists who talk about the Anthropocene do so in order to articulate particular understandings of anthropogenic climate change as it is caused by and relates to interactions between humans and the biosphere. But my interest is in how literary fiction can interrogate, complicate, and think through such understandings. In this thesis I approach the concept in this way: as a means of thinking differently about the human relationship with the biosphere in the context of anthropogenic climate change; and as a way to develop a critical language for examining how literary texts can help readers to re-think their understanding of this crisis. My starting point for thinking about the Anthropocene in this way is the particularly nuanced account of the concept provided by the historian Dipesh Chakrabarty.[36] Chakrabarty draws upon Naomi Oreskes' analysis of how environmental science has increasingly pointed towards a re-thinking of human history by challenging the 'basic tenet of geological science: that human chronologies were insignificant compared with the vastness of geological time; that human activities were insignificant compared with the force of geological processes'.[37] By establishing how human activity *is* significant in the context of geological processes, the concept of the Anthropocene defamiliarises the human relationship with the biosphere and demands an acknowledgment of both human participation in and reliance upon that biosphere. There are many implications to this disruption of previously held assumptions, several of which Chakrabarty examines over the course of four theses. Through the related concepts of biologic and geologic agency,[38] he argues for a way of thinking about humans as a species with a 'deep' geologic history that is part of the history of the biosphere. For Chakrabarty, recognising the geologic agency of humans and thinking of 'human history' as part of the longer 'geologic history'[39] of the biosphere are crucial to our ability to fully understand anthropogenic climate change in a way that has 'human "meaning"'.[40]

In developing his theses, Chakrabarty appears acutely aware of many of the same complexities of anthropogenic climate change to which the commentators discussed above draw attention in their critiques of the Anthropocene. Like Haraway and Žižek, he is aware of the particular role of capital in the history of anthropogenic climate change, but also observes that 'there was never any principled difference' in the use of fossil fuel between capitalist and socialist societies.[41] Nevertheless like Malm and Hornborg, he does acknowledge that thinking about geologic history in terms of a human species risks obscuring the very real historical conditions

under which the 'the unfolding of capitalism in the West and the imperial or quasi-imperial domination by the West of the rest of the world'[42] has accounted for the majority of the historical causes of anthropogenic climate change.[43] Yet he does not view this danger as a reason to stop thinking about the Anthropocene. This is because, unlike Malm and Hornborg, he does not appear to view the Anthropocene as a narrative of universal or inevitable evolution that unavoidably recapitulates species thinking. Instead, Chakrabarty emphasises how the Anthropocene helps us to understand the ways in which humans are part of the planet's biosphere, and how the history of technoscientific progress, and ultimately of industrial modernity, has arisen through the historical contingencies of stable planetary conditions *as well as* the human history of capital. This emphasis suggests that thinking about geologic history, and the recent human influence upon it as geologic agents, can actually challenge the dominant narrative of industrial modernity as either an inevitable product of a privileged human species, or as an intrinsically sustainable project. Instead, geologic history frames the Anthropocene as an era into which humans have 'stumbled' or 'fallen' – in Chakrabarty's words – in part because of certain climatic conditions that are now being actively changed. This understanding of geologic agency is radical and complex, asking us to think 'simultaneously' about the human history of industrial modernity *and* the natural history of the biosphere, and the ways in which both histories are increasingly revealed to be complexly and tightly interconnected.

The ways in which literature can help readers to think in these two historical registers, and think through the complex implications of their interdependency, is one of the key areas of critical enquiry in my analysis of the texts. This is particularly the case in my analysis of J. G. Ballard's *The Drowned World* (1962)[44] and of Kurt Vonnegut's *Galapagos* (1985).[45] I examine how these texts confront a previously assumed split between the human subject as an historical agent and the biosphere as an object exterior to this subject. The literary questioning of this assumed spilt, which is also implicitly questioned by scientific accounts of evolution and ecology, suggests that the speculative and generic resources of fiction might provide one way to address what Isabelle Stengers has described as 'missing thought experiments' that 'disclose their epoch's capacity to feel that there are other possible ways for a world to consist'.[46] It is in imagining such 'other possible ways' that fiction can help us to think differently about the complex and interdependent relationship between the human subject and the biosphere implied in Chakrabarty's account of the Anthropocene.

Gestell and Ideology: Reading the Anthropocentric Foundations of Modernity

However, whilst such 'thought experiments' of the Anthropocene might begin to help us to think through the ways in which the human subject is entwined in a complex and interdependent

relationship with the biosphere, the Anthropocene does not on its own provide a sufficient means of analysis for identifying how texts might reveal the ways in which this complex relationship is otherwise obscured. To do this we must develop a critical vocabulary with which to trace how this obfuscation operates. In this thesis I suggest that we can begin to understand this problem in terms of a particular anthropocentric view of nature that structures how the human relationship with the biosphere is thought about under conditions of industrial modernity. Martin Heidegger described this effect well in his account of the '*Gestell*' or 'enframing' of nature through technology.[47] This enframing, Heidegger suggests, always imagines nature as a potential resource, and consequently tends to place humans in an exploitative relationship with nature that makes it impossible to properly situate humans as a species within the environment.[48] This anthropocentric view of nature as a resource for exploitation casts the biosphere as an object, and is suggestive of the same facile belief in a separation of humans from nature that Atwood has also drawn attention to in her appraisal of *Silent Spring*. Namely: 'the perceived split between man and nature' that Carson's book highlights as unreal, and the 'control over nature' that this imaginary relationship with nature legitimises.[49] Such an anthropocentric view of the relationship between humans and the biosphere must appear to our contemporary eyes as cutting to the heart of the 'anthropos' in anthropogenic climate change; it is precisely the wilful and unquestioned exploitation of nature that causes this change.

Tellingly, the structuring of understandings of the world through a technological 'enframing' is also reminiscent of Paul Boyer's assertion that nuclear weapons constituted a Kantian 'category of Being, like Space and Time' that is 'built into the very structure of our minds, giving shape and meaning to all our perceptions'.[50] Kant's influence upon Heidegger notwithstanding, it is significant that Boyer draws attention to how the destructive technologies of the nuclear age shaped a distinct way of perceiving the world. The idea that the technology with which the world is physically re-shaped also shapes the ways of perceiving that world marks an important point of convergence between nuclear weapons, and the technologies of modernity through which nature is enframed as a resource in the unfolding of anthropogenic climate change. This convergence is significant in part because it highlights how reading the enframing of nature in texts from the Cold War era helps us to think through and beyond the Anthropocene *avant la lettre*.

Indeed, in my close textual analysis of two Cold War era novels by JG Ballard – *The Drowned World* and *Hello America* (1981)[51] – I develop a critical perspective that traces how the 'enframing' of nature as a resource for human exploitation is revealed to underpin the ways in which the characters in these novels construct their understanding of their own relationship with the biosphere. This analysis draws upon a rethinking of Louis Althusser's conception of ideology to contribute further to the critical vocabulary of the thesis. Although Althusser himself never

thought about ideology in terms of the environment, he did draw upon Lacan's account of the 'real' when describing how ideology encourages individuals to ignore their 'real conditions of existence'[52] in reproducing the processes of production and consumption. In Lacanian psychoanalysis, the 'real' is a primordial or 'natural' condition that humans only experience in infancy before entering into the symbolic and imaginary orders. This 'real' is therefore inaccessible from an understanding of the world through constructed human systems of meaning and interpretation, and in this sense I would suggest that the Lacanian real might be re-thought as a non-anthropocentric experience of nature. According to Lacan's account of the real in *The Four Fundamental Concepts of Psychoanalysis*, the individual subject can never regain the experience of this condition of the real; it 'eludes us'.[53] But Lacan also suggests that the experience of trauma can mark the absence of the real, even as it is concealed; he describes the traumatic encounter with the real as 'essentially the missed encounter'.[54] Although the real itself remains absent in this missed encounter, this absence is marked by the trauma. Lacan's psychoanalytic understanding of this encounter expands upon the Freudian understanding of traumatic repetition; it is through the repetition of traumatic experiences that trauma continues to mark the absence of the real. Lacan's ideas on trauma and the real have been influential on trauma theory – Michael Rothberg describes *The Four Fundamental Concepts of Psychoanalysis* as 'one of contemporary trauma theory's foundational texts'[55] – and suggest ways of understanding traumatic repetition as 'indicative of a reality which it conceals at the same time'.[56] Such repetitions, in particular through dreams and hallucinatory flashbacks, are apposite to my reading of the traumatic marking of the real in *The Road* in Chapter 2, in which I draw specifically upon the psychoanalytic understanding of trauma theory offered by the critic Cathy Caruth in her reading of that novel, and upon the further interpretation of this reading offered by Petter Skult. It is through the repetition of one of the main character's traumatic experiences that I suggest the novel marks the absence of a non-anthropocentric experience of nature.

The traumatic – and repetitious – 'missed encounter' with the real also features in my close readings of the two Ballard texts in Chapter 1. In these readings I suggest that the environmental catastrophes experienced by those texts' central characters imaginatively depict traumatic disruptions to the symbolic order, and that this depiction provides a way for the texts to mark the absence of an experience of what we might term the real conditions of the biosphere. Crucially, these characters had been previously encouraged to ignore those conditions by an imaginary and symbolic ordering that both texts frame as essentially anthropocentric. It is through this ordering that those individuals have been encouraged to maintain an imaginary relationship with the biosphere. Ballard's depictions of traumatic disruptions to this anthropocentric ordering help us to re-think Althusser's account of ideology: not only can this account help to explain how the history of capital is maintained, it can also provide a means of

understanding the ways in which the individual is encouraged to reproduce the anthropogenic processes through which the Anthropocene unfolds. My reading of the environmental catastrophe and its effects upon characters in the Ballard texts begins to reveal how literary fiction can uncover this ideological process.

This re-thinking of the Althusserian conception of ideology as a way of understanding how the anthropocentric enframing of nature is reproduced informs the distinct critical vocabulary with which I analyse these texts. Through this vocabulary I demonstrate how literary texts defamiliarise the imaginary relationship between humans and the biosphere through various formal techniques and devices such as setting, character and narrative. I identify how such techniques encourage readers to rethink the individual's anthropocentric understanding of their relationship with the biosphere that the concept of the Anthropocene invites. It is these formal techniques of defamiliarisation that define and distinguish literature's contribution to the individual's sense of their own complicity in anthropogenic climate change.

In tracing this defamiliarisation, my analysis of the texts examined here suggests a very different way of imagining the categories of 'human' and 'biosphere' than that which is reproduced through the artificial anthropocentric separation of those categories. But in approaching this new way of thinking we must also undertake a further re-thinking of ideology that accounts for how Althusser's own understanding of ideology was challenged in subsequent analysis. Inasmuch as ideology is useful as a means of describing how individual human subjects are encouraged to reproduce an imaginary relationship of infinite exploitation with the biosphere, the traditional Althusserian critique of ideology is arguably limited in its understanding of these categories themselves; in asserting how the state misleads the individual, Althusser appears to assume a suspiciously universal 'real' human condition that is merely obscured by ideology. The problem with this assumption is thrown into stark relief by the Anthropocene's various gestures towards the complex interdependences of the human-biosphere relationship itself, which suggest a more complex intersection of human cultures, histories and biologies than that encompassed by Althusser's understanding of what ideology obscures. Indeed, Gilles Deleuze subsequently challenged Althusser's account of how a pre-existing and universal human subject was repressed by the state through the idea of 'becoming'. For Deleuze, there is no fixed real human 'being' – no 'pre-social and essential human individual that we might discover underneath [ideological] power and images'[57] as Claire Colebrook has described it – but rather an ongoing flow of 'becoming'. Through this 'becoming', entities exist through movement within a complex 'assemblage' of elements that have no essential organising coherence. This movement involves the influence of elements that change and transform each other. Deleuze provides a famous example of this 'becoming' in his work with Félix Guattari; the encounter between the wasp and the orchid that appears to mimic the wasp. In this encounter, the orchid is not simply mimicking the wasp's

appearance and pheromones in order to attract it. Rather the orchid is 'becoming-wasp' and the wasp is 'becoming-orchid' through interlinked 'relays in a circulation of intensities' in which both move along a 'line of flight' that is not grounded in any other more fundamental relation between them.[58] As Colebrook has subsequently described it, a plant such as an orchid is not a static entity for Deleuze, but rather a process of becoming – through the becoming of other elements such as 'light, heat, moisture, insect pollination'[59] – that we only perceive as the fixed category of plant. Where Althusser suggests that we must strip away a false image of the human in order to perceive a 'real' human, Deleuze instead asserts a need to add to the 'human' an awareness of all of the elements that – like the orchid – constitute us in our becoming. These include the imaginary power to think of what we are not, so that Deleuze even considers the 'imaginary' or 'virtual' as being part of thinking about becoming.

We can see then that the Deleuzian account of 'becoming' within an 'assemblage' itself suggests a particular disruption of the smooth repetition of the anthropocentric separation between discrete and fixed categories of human and biosphere by calling those categories themselves to account; such fixed categories actually serve as grounds of understanding that are obstacles to perceiving the chaotic flow of 'becoming'. Following Deleuze, Latour has also reacted against the tendency – arguably exemplified in Althusser's ideological critique – of imagining the world in terms of an essential real obscured by an entirely false imaginary. In particular, Latour highlights the paradox of describing the world in terms of 'objects' that are understood as both 'empty white screens on which is projected the power of society, domination, whatever'[60] that determine actions, and at the same time as 'indisputable causal explanations' for those actions.[61] Such a paradox proceeds in part from problematic conceptions of the 'real' that do not encompass the multitude of possibilities and intersections between different aspects of the human and non-human that I would suggest are also gestured towards by the Anthropocene's challenge to anthropocentric thinking. Like Deleuze, Latour emphasises the need to imagine the world in terms of such possibilities; he borrows Heidegger's use of the word 'gathering' to denote how 'things' are 'arenas' of multifarious human and non-human 'participants'.[62] In this account, the human is not an entity with an essential reality whose truth is obscured by an ideology to be unmasked. Rather, a human is a 'matter of concern' held in place by 'the whole earth and heavens'.[63] Thinking about this matter of concern means 'adding' to the human the gathering of elements through which it comes to be. We can now understand this way of thinking as both particularly relevant and necessary in the Anthropocene; the need to gather together the complex interdependencies of multiple biologies, the non-human and non-living participants of the biosphere, and the human histories of modernity.

In rethinking Althusser's account of ideology in terms of how the anthropocentric separation between human and biosphere is maintained, it is therefore apposite to also re-think

Althusser's sense of the 'real', which otherwise does not adequately account for the kind of amorphous and complex interactions of elements suggested both by the Anthropocene and the reactions of Deleuze and Latour to the limits of Althusser's account of ideology. My theoretical framework therefore develops in the second half of the thesis to examine how literary fictions provide a way to think through these complexities. In these close readings I draw in particular upon the concept of 'assemblage' as described by Isabelle Stengers in relation to the implications of thinking about the Anthropocene. Stengers' thinking here owes an intellectual debt to Deleuze's work on 'becoming', to the Deleuzo-Guattarian development of the assemblage, and also to Latour's call for a critical idiom that 'adds' the multiplicity of elements through which 'matters of concern' – such as the human – come to be.

In taking the approach outlined above, this thesis necessarily encompasses discussions of both scientific understandings of the complexity of the human-biosphere relationship, and the ways in which such understandings and knowledge claims are made use of. This 'making use' or instrumentalisation of science is important because it has profound implications for a number of critical issues surrounding anthropocentric climate change. These include: the public perception of the human-biosphere relationship; the individual and collective choices that proceed from that perception; the political policy making that claims to respond to scientific knowledge claims; and the technology that is both enabled and potentially legitimised through science. These implications are particularly apposite to Chapters 3 and 4, which explicitly examine how science and scientists are depicted in the texts examined there.

The potential for science to produce knowledge that complicates existing assumptions clearly underpins this thesis' interest in the Anthropocene as an idea that challenges the anthropocentric separation between human and biosphere. Yet we must also be mindful of the distinctive moves that take place between the origins of scientific knowledge claims within science itself, the authority of science as it is perceived in public and political spheres, and the uses to which such knowledge is subsequently put. For example, the scientific method – whilst not universally defined[64] – is predicated on a desire to be neutral in describing how a given aspect of the physical universe 'is'. Yet the questions that are asked of such a method, and the interpretations and uses of the answers produced, can easily be understood in a normative way that misleadingly places science in the role of declaring how things 'should' be. This move from a neutral description to a normative interpretation relates to what the evolutionary psychologist Steven Pinker has described as 'naturalistic' and 'moralistic' fallacy.[65] With these terms Pinker follows in a tradition of thinking in philosophy and science and technology studies[66] that draws attention to the tendency to believe that 'what is found in nature is good' and 'what is good is found in nature'. Since it is science that 'finds' what is in nature, these fallacies clearly describe a

tendency to interpret scientific knowledge – a description what 'is' - as a measure of what 'should be'.

These fallacies can help us to understand how science can be seen as normative in its intentions and can be put to instrumentalist uses in legitimising a given policy-decision or technological outcome. At the same time, these fallacies are also recognised by scientists themselves, as Steven Pinker himself illustrates. Indeed, Steven Shapin has described how 'very many scientists' attest that 'questions about what ought to be done – for example about the consequences of their own work – were not their preserve'.[67] Yet Shapin also notes a tension here between this recognition of the naturalistic and moralistic fallacies, and the tendency identified by science and technology studies for science to be called upon as the arbiter of 'many social and political decisions'.[68] Given that, as Shapin goes on to say, it is scientists 'that are turned to when we want an account of how matters stand in the natural world' it is important to also recognise that 'it is not scientists who decide what ought to be done'.[69]

This distinction paints a complex picture of science as a means of acquiring knowledge about the world – including important and urgent knowledge about the human relationship with the environment and anthropogenic climate change – that is also necessarily self-limiting in terms of pronouncing what should be done as a consequence of that knowledge. But this distinction is itself complicated by science's relationship to technology. It is not simply the case that science is not about laying claim to moral truths from its findings; Shapin suggests that science is also more properly about finding 'what "works"' or what coherent understanding of theory and evidence allows 'scientists most powerfully to predict and control'.[70] This emphasis on 'what works' means that science has to be considered alongside technology; science is no-longer considered authoritative based solely upon an account of what 'scientists know', but rather also upon a promise of 'what they can make happen'.[71] Because of this emphasis on enabling new technologies through which 'wealth, health, and power' can be enhanced, science is also now 'enfolded' into 'the institutions of wealth-making and power-projecting' – making it harder to perceive the neutral and independent intentions that are nevertheless enshrined in its method.[72]

It is because of this intimate relationship between science and technology that I make reference in this thesis to 'technoscience'. By this term, I mean to refer to both the practical instrumentalisation of science through technology within modernity, and to the causes and effects of such instrumentalisation. The technology that science enables both exists and is used outside of science's central aim of describing the material universe, and in this sense technology reflects and brings into acute focus the difficulties of asking science what should be done with the knowledge it produces. Technology also has (scientifically) demonstrable effects upon the biosphere, and as we have seen above also enframes aspects of that biosphere in ways that tend to reproduce the anthropocentric foundations of ideology. Technoscience therefore not only

constitutes the technological instrumentalisation of science, but also marks the social and political contexts that direct scientific research and the ways in which scientific knowledge is put to use – the moral decisions we make about that knowledge and how it is 'enfolded' in non-scientific interests. As I demonstrate in the second half of this thesis, literary fiction can help readers to think through the limits and consequences of this instrumentalisation. But it can also do so in particularly nuanced ways that nevertheless reflect science's contribution to the ways of thinking differently about the human relationship with the biosphere that I suggest are taken up by the texts themselves.

In reading these texts in this way, this thesis also broadly overlaps with the literary critical field of ecocriticism. Traditionally, ecocriticism has focused upon what Cheryll Glotfelty described as the 'relationship between literature and the physical environment' in ways that consider 'the interconnections between nature and culture, specifically the cultural artifacts [*sic*] of language and literature'[73]. As Greg Garrard notes, this traditional focus on analysing the representation of nature in literary works has in more recent years broadened to include other cultural artefacts from film to the architecture of shopping malls.[74] Coeval with this broadening of the subject of ecocriticism is an increased interest in how the 'relationship of the human and non-human' is represented.[75] Such trends clearly overlap with this thesis' focus upon the literary representation of the relationship between the human subject and the biosphere; however, they do not specifically address the multiple ways in which literary texts register the implications of the Anthropocene that I examine in this thesis. Specifically, the critical language that I apply to my analysis seeks to identify how texts situate and debate the ways in which the human subject of modernity is encouraged to understand their relationship with the biosphere in a particular way that obscures a far more complex and interconnected assemblage of relations. It is the literary exploration of these relations that help us to think through the particular and pressing implications of anthropogenic climate change that are brought into focus around the concept of the Anthropocene. In this respect, this thesis attempts to think through and beyond the implications of recent climate change criticism.

Thought Experiments of the Anthropocene: Research Questions and Distinct Critical Focus

The critical perspectives discussed above both attest to and shed light upon different ways of thinking about the human relationship with the biosphere that are demanded by anthropogenic climate change. But through what specific literary techniques can literary fiction help readers to think through and beyond these insights – and this relationship – in new and productive ways? I have already suggested that traditional representations of apocalypse and scientists can serve to reproduce a faith in the efficacy of technoscience to exert human power over an objectified

biosphere by depicting how such power rescues human society from environmental apocalypse. Clearly this faith is underpinned by precisely those anthropocentric assumptions of human mastery over nature that enframe nature as an infinite resource for human exploitation. But such faith is complicated by the open questions of the human relationship with the biosphere – individually and collectively, biologically and historically – that are posed by the Anthropocene. How then has literary fiction anticipated or reflected these open questions through speculative narratives of apocalypse and science in ways that help readers think differently about their individual and collective relationship with the biosphere in the context of anthropogenic climate change? The thesis approaches this overarching question through several research questions. If accounts of the human history of modernity have until recently overlooked the complex interdependencies between the human species – and its contemporary fossil fuel cultures – and the geologic history of the planet, how has contemporary fiction attended to this oversight? What light can be shed upon predominant understandings of anthropogenic climate change by speculative apocalyptic future histories of the biosphere that do attend to this complex interdependency? How has fiction highlighted the ways in which the insights and open questions of the Anthropocene complicate the promises of science and technology to explain and provide solutions to anthropogenic climate change? And how can fiction contribute to a nuanced account of both the insights offered by science and its limitations?

In answering these research questions, I contend in this thesis that the speculative literary depiction of both apocalypse and scientists can in fact provide the necessary 'thought experiments' to which Stengers alluded earlier. These literary 'experiments' work by providing particularly urgent ways of rethinking anthropocentric assumptions concerning the human relationship with the biosphere and the faith in technoscience as a means of intervening in that relationship. For in as much as the apocalyptic narrative of the conventional fictions discussed above might be familiar in the way that hero scientists deploy technoscience in order to restore the conditions of modernity that are ultimately only disrupted by environmental changes, this familiarity can itself be disrupted by apocalyptic narratives that imaginatively depict radical and irreversible changes. Similarly, the faith in technoscience as a means of intervening in these apocalyptic narratives can be challenged through depictions of science and scientists that make use of techniques of irony and narrative focalisation to reveal the epistemological blind spots and anthropocentric assumptions that underpin such faith. It is these blind spots and assumptions that obscure how science can be misleadingly and dangerously instrumentalised in the interests of industrial modernity.

This thesis therefore focuses upon two literary modes through which fiction can disclose the anthropocentric assumptions to which the critical perspectives outlined above only gesture, and speculate upon their apocalyptic implications. These modes are: the defamiliarisation of the

human subject's relationship with the biosphere through apocalypse; and the challenge to a faith in technoscience as a means of intervening in such apocalyptic outcomes through the depiction of science and scientists. By bringing together analyses of both of these modes – and the particular literary techniques with which they are brought forth in the texts – this thesis identifies how each specific text encourages readers to rethink their own assumptions about their relationship with the biosphere in light of the Anthropocene.

This focus – in particular upon apocalyptic representations of environmental disruption – is not without precedent in the recent critical attention given to climate change in fiction. The eco-political theorist Andrew Dobson for example has characterized 'the fiction of climate change' in terms of 'grim' futures specifically imagined as 'different from the present' and containing 'lots of weather – preferably wild and wet'.[76] In a similar vein, Adam Trexler and Adeline Johns-Putra identify 'future histories of significantly altered environments'[77] in the science fiction of the 1960s and 1970s as marking the beginning of their recent survey of climate change in literature. What these apocalyptic representations of changed environments have in common is an emphasis upon representing the 'difference' between the textual world and the world of the reader that Adam Roberts suggests is a particular trait of science fiction.[78]

Science fiction's particular contribution to environmental concerns is taken up more specifically by Rob Latham when he describes how a tradition of writing that addresses 'biotic invasions' through tales of alien invasion has become 'polemical' and 'politicised' as a means of imagining ecological destruction as a form of 'ecological imperialism'.[79] This process, which he traces back to the early 'New Wave' of J. G. Ballard's 1960s 'disaster quartet',[80] offers one strain of science fiction that appears to anticipate the more recent challenges to the legitimacy of the human power over nature. Roger Luckhurst has similarly described genre science fiction's 'cultural work' more generally as an expression and reflection upon 'the terrors and delights of technologized modernity',[81] an analysis that appears apposite to the anxieties surrounding anthropogenic climate change. Indeed, Luckhurst describes how the 'technological crisis' apparent in the science fiction of the 1970s foregrounds both a sense of what Ernest Mandel called the 'omnipotence of technology [as] the specific form of bourgeois ideology in late capitalism' and a sense of the 'limits of a rapacious modernity' signalled by the concerns of the 'nascent ecology movement' towards such dangers as the long term effects of over-consumption and over-population.[82] Mandel's sense of '*belief* in the omnipotence of technology' as the 'specific form' of 'bourgeois ideology'[83] in the contemporary context is particularly significant, as it complements my re-thinking of Althusserian ideology's concern for the individual's 'belief' in an imaginary relationship with the real conditions of the biosphere. I would suggest that the 'belief' Mandel describes parallels the imaginary relationship with the biosphere that I have suggested is

inscribed through the anthropocentric enframing of nature described by Heidegger,[84] and which can be revealed through fiction.

What Luckhurst describes as the 'cultural work' of science fiction – its reflection upon 'the terrors and delights of technologized modernity' – therefore appears particularly apposite to the 'cultural work' of precisely that fiction that uncovers the anthropocentric enframing of nature by technology, and which in doing so disrupts its repetition. In this regard, the focus in this thesis upon both the depiction of apocalypse and the representation of science and scientists may suggest that science fiction is the over-arching literary mode that should concern us. But whilst science fictional conventions of the kinds identified by Roberts, Latham and Luckhurst provide effective literary techniques with which texts can confront and complicate the anthropocentric assumptions that underpin anthropogenic climate change, it would be counter-productive to limit our analysis to texts formally classified by publishers or commentators as science fiction. Indeed, it is notable that many of the more recent texts that are identified by critics as engaging with anthropogenic climate change are not packaged as science fiction at all. Examples include T. C. Boyle's *A Friend of the Earth* (2000),[85] Margaret Atwood's *Oryx and Crake* (2003),[86] as well as Cormac McCarthy's *The Road* (2006)[87] and Ian McEwan's *Solar* (2010).[88] These texts share no particular genre definition beyond that of contemporary fiction. Furthermore, critical approaches to these texts reveal a variety of interpretations as to the ways – and even the extent – to which they contribute to the reader's understanding of anthropogenic climate change. For example, the future setting and transformed environment of T. C. Boyle's *A Friend of the Earth* (2000) is interpreted by Elisabeth Schäfer-Wünsche as an example of a satire of 'ecological doomsday'.[89] This satire draws attention to the limits of traditional forms of environmental activism, whilst also highlighting the consequences of such limits in the future destruction of the landscape and threats to the human body. However, the eco-critics Zumbansen and Fromme suggest that the novel subordinates its material depiction of climate change to the 'cognitive and emotional challenges' that the crisis elicits in the novel's narrator.[90] This interpretation suggests that the novel is more concerned with the internal and psychological effects of climate change on human consciousness. The divergence of these analyses, and those offered in critiques of other texts mentioned above, highlights the difficulty of thinking about anthropogenic climate change in fiction in terms of either a stable genre or a singular project – a difficulty to which Trexler and Johns-Putra also gesture in their survey of critical approaches to climate change in fiction.[91] Indeed, whilst the focus in this thesis upon depictions of apocalypse and representations of science and scientists is broadly in keeping with recent trends in the critical approach to anthropogenic climate change in literature, it is also clear that the critical frameworks employed in such approaches – the questions being asked of such literature – remain varied.

As highlighted earlier, critical interest in the concept of the Anthropocene itself is both recent and contested, yet has not necessarily found specific form in the critical analysis of literary fiction. Indeed, as Adam Trexler notes in the introduction to his book *Anthropocene Fictions* – published as this thesis was being written up – theoretical approaches to the Anthropocene have tended to eschew direct engagement with literature, in favour of a 'rush to pronounce on the ontology of the Anthropocene'.[92] In seeking to redress this, Trexler himself draws on environmental criticism and science studies to take an 'open and analytical approach' to the increasing 'archive' of climate change fiction that asks how the 'capacities of recent literature' has been changed by the crisis.[93] Other critics have recently focused on more specific yet differentiated aspects of the Anthropocene in approaching literary fiction: Louise Squire's reading of *The Road* examines how the novel thinks through the 'aporia of death'[94] suggested by the Anthropocene's emphasis on the finitude of human species life; by contrast Jason Groves has drawn upon the concept's geological implications to read Goethe's *Wilhelm Meister's Journeyman Years* as a form of a 'petrofiction'.[95]

The importance of this recent – yet varied – critical interest in the Anthropocene as a way of reading texts in the era of anthropogenic climate change is underscored by Timothy Clark's discussion of the limits of traditional literary critical approaches to the particular 'scale effects' that are thrown into relief by the crisis. In his essay 'Derangements of Scale' Clark notes that existing literary and cultural criticism reflects the assumptions of scale of the seventeenth and eighteenth century liberal democratic tradition.[96] These assumptions tend to obscure what I have been describing here as the complex and interconnected assemblage of relations illuminated by the Anthropocene, because they do not take into account the finitude of planetary resources nor the scale of spatial and temporal effects needed to recognize a contemporary situation in which 'it is not irrational to connect a patio heater in London immediately with the slow inundation of Tuvalu in the Pacific'.[97] It is as if, as Clark puts it, 'critics were still writing on a flat and passive earth of indefinite extensions'.[98] Clearly, this is not the complexly interdependent earth of multiple historical scales that is constitutive of the concept of the Anthropocene.

By way of a differentiated approach to this tradition, Clark offers up a reading of Raymond Carver's short story 'Elephant' (1988) in which he approaches the text from three different historical – and indeed spatial – scales. These are: the local experience of the story's narrator over a few years; the national historical context of late twentieth century America over several decades; and a 'hypothetical' planetary scale that Clark suggests in terms of the six centuries surrounding the story's setting. It is through this third scale that Clark draws attention to the critical work often overlooked by traditional literary criticism; he suggests that the effect of reading the text in terms of a longer historical scale is that those aspects of plot, character and setting that appear normal and harmless on the other scales are suddenly revealed to be

destructive. This way of reading texts suggests a particularly productive way of thinking through the complex interdependencies of human and non-human agency, so that for example the otherwise naturalized presence of cars in the story becomes a way of thinking about 'energy slavery'.[99]

Whilst acknowledging that his scaled readings of 'Elephant' conflict with each other, Clark does not suggest that any one of them is preeminent; rather he draws attention to the value of encountering the 'unfamiliar shapes' that arise when the movement between scales such as human and environmental history is given critical attention.[100] It is by examining this movement between scales that Clark suggests critical approaches to literature can begin to elucidate the complex interconnections between humans and biosphere that are needed in thinking about anthropogenic climate change. Whilst he does not refer to the Anthropocene itself, I would suggest that the 'movement' between scales described by Clark – and the effect of such movement for reading a text – resonates with my particular focus upon reading the differing human and geologic scales of the Anthropocene in recent literary fiction.

Questions of complexity and interconnectedness are also at stake in Timothy Morton's ideas on ecological thought and ecological reading practices. In *Ecology Without Nature*, Morton identifies a problem with the idea of 'Nature'[101] similar to the critiques of human-subject/biosphere-object dualism discussed earlier. For Morton, the very idea of 'Nature' gets in the way of ecological thinking, because it imagines a 'thing' called 'Nature' that is set up in traditional understandings – including those of environmentalism and ecocriticism – as a 'transcendental, unified, independent category'.[102] The problem as he sees it is that the idea of 'Nature' reproduces differences between 'subject and object', 'inside and outside', 'human' and the 'non-human other' – even as it is ostensibly used by environmentalists and others to challenge or complicate these differences.[103] Thus, even when described as something that 'surrounds' humans or binds them in a 'continuity' with non-human beings,[104] the idea of 'Nature' continuously re-asserts the separation and exteriority of everything that is not human.

Against this view of 'Nature', Morton suggests a view of the world as 'an infinite web of mutual interdependence where there is no boundary or centre'.[105] This view is something he expands upon in his subsequent work *The Ecological Thought*, described by Morton himself as a 'prequel' to *Ecology Without Nature*.[106] The 'ecological thought' incorporates just such a view of the world through what Morton describes as the 'mesh', a concept derived from ecological science's description of a world in which 'all beings are connected'[107] in a 'vast, sprawling mesh of interconnection without a definite center or edge'.[108] Morton's account of the mesh shares certain continuities with the implications of the Anthropocene that I have already described, in that the deep interdependencies of human and geologic history that are revealed by science – indeed the Anthropocene's challenge to the distinction between these histories – opens up a

similar consciousness of interconnectedness to that which Morton describes as the mesh. In one particularly apposite example, Morton describes how 'all life forms are the mesh, and so are all dead ones, all habitats, which are also made up of living and non-living beings […] We drive around using crushed dinosaur parts. Iron is mostly a by-product of bacterial metabolism.'[109] In this example, the mesh appears to share the Anthropocene's sense of the interchangeable connections between human and non-human histories, biological and non-biological histories, and the historical contingency of human technologies upon biological-mineral processes over geological time.[110]

In drawing attention to these connections, and the scales over which they unfold, Morton's account of the mesh also has continuities with Clark's emphasis on scale effects. When Morton proposes that a 'truly ecological reading practice would think the environment beyond rigid conceptual categories – it would include as much as possible of the radical openness of ecological thought',[111] he is calling for an approach to reading that is conscious of the 'ramifications' of the mesh, in which the ecological thought itself becomes possible.[112] 'Ecological reading' for Morton then means thinking about the 'unimaginably gigantic mesh', or in his terms 'thinking big – as big as possible, and maybe even bigger than that, bigger than we can conceive'.[113] Such 'big' thinking suggests a shift in spatial and temporal perspectives, the effect of which is a feeling of 'displacement and disorientation' in which each 'entity' in the mesh looks 'strange' because it no longer looks like 'itself' when viewed as part of the de-centered and fluid interconnections of the mesh.[114] We might suggest that what Clark describes as the 'unfamiliar shapes' revealed through moving between or across scales in the reading of a text is similar to this experience of 'displacement and disorientation'. But whilst Clark's proposed approach to reading focuses more specifically upon historical scales, Morton's ecological reading is also concerned with how texts might help us to 'think through the mesh of life forms as far out and in as it can',[115] an assemblage of relations of which history is only one way of traversing.

As an approach to thinking through complex interconnections over vast and shifting scales, the Anthropocene suggest a means of reading texts that makes some similar moves to the 'thinking big' of Morton and the derangements of scale described by Clark. What is distinct about my use of the Anthropocene as a way of approaching literary fiction is my focus on how the concept challenges the anthropocentric separation of human and biosphere by revealing and complicating some of the specific means by which that separation is perpetuated. This focus informs the distinct and specific critical framework that I proceed to develop over the course of the thesis, through which I seek to identify how the imaginative resources of literary fiction can encourage readers to think through and beyond the alternative ways of thinking demanded by the open questions of the Anthropocene. In developing this framework, I begin by bringing together my reframing of Heideggerian anthropocentrism and my rethinking of Althusserian

ideology in order to identify how literary fiction has drawn attention to the limits of dominant ways of thinking about the human relationship with the biosphere, and in particular how these dominant ways of thinking routinely serve to obscure the perspectives necessary for thinking about anthropogenic climate change. As the thesis progresses, I develop these initial concepts to demonstrate how the speculative resources of apocalyptic fiction can work to defamiliarise the anthropocentric relationship between humans and the biosphere. In the second half of the thesis, my focus builds towards an analysis of how the scientific understanding of that relationship can be further defamiliarised by ironic fictional representations of science and scientists. By reading apocalyptic literary 'thought experiments' alongside literary critiques of scientific understandings of the human biosphere relationship, the thesis identifies how literary fiction in the Anthropocene can intrude upon anthropocentric modes of thought and help readers to think in profoundly different ways about anthropogenic climate change. Through this analysis, the thesis seeks to contribute specific insights into the emerging field of anthropogenic climate change criticism.

Staying With the Trouble: Methodology and the Rationale for the Choice of Texts

Methodologically, this thesis conducts close readings of specific novels written from the core of the global system of capital that is so heavily implicated in anthropogenic climate change. By conducting sustained textual analysis upon such texts, the thesis seeks to identify how these literary fictions can trace and challenge the anthropocentric habits of thought that lie at the heart of the system of which they are a part, and the environmentally damaging industrial modernity that this system perpetuates. In order to conduct such a sustained analysis of each novel, the thesis does not attempt a broad survey of the increasingly large number of texts that might be productively examined, but instead consists of case studies of a small number of selected texts that exemplify the concerns articulated in the research questions discussed above. Each case study therefore serves as an example that pays particular attention to how literary techniques – in particular the speculative depiction of radically altered space-time, and the ironic use of narrative focalization – work to defamiliarise specific anthropocentric assumptions. In conducting these case studies, I demonstrate how each text offers profound and significant insights into how literary fiction can critique the anthropocentric ways of thinking that underpin the conditions under which this crisis has come to occur; the ways in which these conditions are maintained; and the responses that are offered to it.

In taking the approach outlined above, the scope of the thesis is necessarily selective; it would not be possible to subject a larger number of texts to such close analysis in the present

thesis, but it is hoped that the insights gained through the close examination of each text and the development of my critical framework provide useful approaches to other texts not considered here. The main rationale for selecting the texts for each case study was that they should reward analysis through this framework whilst also contributing to its on-going development. Texts were therefore selected that exemplify specific concerns for how the human subject of industrial modernity imagines themselves in relation to the biosphere, and which in doing so effectively intervene in the repetition of the anthropocentric enframing of nature in the service of that modernity. The texts were also selected so as to include both earlier texts that pre-date what Pinkus describes as the 'very recent collective consciousness'[116] of anthropogenic climate change, and specifically recent texts that have been published within – and interpreted by commentators in the light of – this consciousness. In selecting texts in this way, I have sought to demonstrate how the preoccupations of earlier texts can be productively re-examined in terms of the open questions of the human relationship with the biosphere that are thrown up by the Anthropocene. I have also sought to show how the concerns of the more recent texts build upon earlier critiques of the ways in which the anthropocentric assumptions of industrial modernity structure dominant understandings of this relationship.

The Earlier Texts

The four earlier texts – J. G. Ballard's *The Drowned World* and *Hello America*, and Kurt Vonnegut's *Cat's Cradle* (1963)[117] and *Galapagos* – are written by authors whose writing is particularly associated with critiques of modernity that vividly express these concerns. Indeed, whilst writing from British and American perspectives, Ballard's wartime internment by the Japanese, and Vonnegut's experience of the firebombing of Dresden, famously influenced their subsequent literary concerns for the stability and implications of industrial modernity. These concerns are manifested in Ballard's early writing by what Rob Latham has described as a 'critique of technocracy'.[118] *The Drowned World* and *Hello America* exemplify such a critique through environmentally apocalyptic challenges to the technoscientific power of modernity, and by depicting the psychological effects of these upon their central focalising characters. In doing so, both texts embody a profound and distinctive Ballardian concern for how dominant ideas about human relationships with the biosphere are produced and maintained in the psyches of individuals within industrial modernity.

These dominant ideas are confronted in different ways in Vonnegut's *Cat's Cradle* and *Galapagos*, both of which typify a Cold War scepticism towards the implications of technoscience in asserting human power over nature. Through the classically Vonnegutian use of irony, narrative focalisation and the imaginative representation of complex causality, these texts exemplify a

concern for the interdependency between humans and the biosphere. This concern is particularly acute in the ways each novel sets out to disrupt the reader's expectations of science's role in enacting human agency and explaining the human relationship with the biosphere.

In selecting these Cold War era texts, I have been conscious of the ways in which some of them have more recently been reframed as prophetic or in other ways relevant to the crisis of anthropogenic climate change. For example, *The Drowned World* is increasingly offered as an example of Ballardian prescience concerning climate change despite portraying an ostensibly non-anthropogenic evolution of the environment. This reframing of the novel is particularly apparent in the paratextual matter that has accompanied recent reprints, in particular the choice of cover art and the quotes from commentators and other writers that are used to market the book. The 2006 Harper Perennial edition for instance features fish and a manta-ray swimming over an otherwise familiarly twenty-first century London skyline [*Figure 1*]. In contrast to the exotic far-future of the first edition in 1963 [*Figure 2*], this image specifically associates the 'drowning' of the book's title with a London familiar to a contemporary reader. The front cover of the 2008 edition makes a similar link between the novel and contemporary anxieties of climate change by prominently featuring a 2007 quote from Phillip Pullman that casts Ballard as an 'extraordinarily prescient' prophet of climate change.[119] This is a claim that is also confronted and examined in Will Self's foreword to the 2014 Fourth Estate edition.[120] Whether we agree with Pullman, or take Self's view that such prophecy is unimportant to the value of the novel, it remains the case that the publishers of these recent editions are specifically seeking to frame the novel as newly relevant to the experiences of readers living through the current crisis of anthropogenic climate change.

Figure 1: 2006 cover of *The Drowned World*

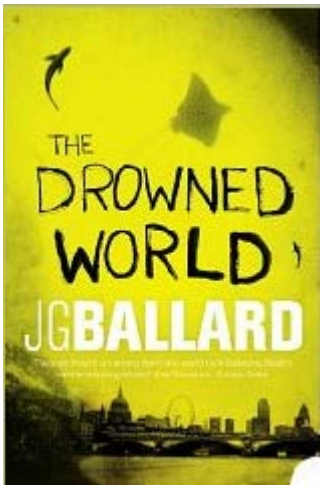
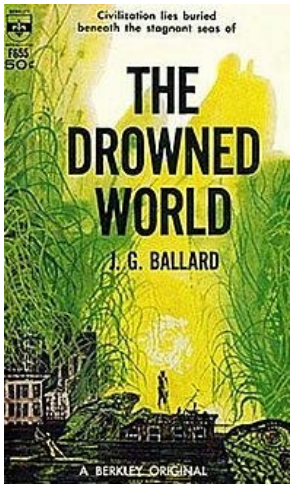


Figure 2: 1963 cover of *The Drowned World*



These forms of paratextual matter – what Gerard Genette's English translators describe as 'thresholds of interpretation'[121] – are important because they indicate the ways in which contemporary readers are encouraged to understand a text such as *The Drowned World* as a form of climate fiction.[122] A similar paratextual reframing is apparent in recent editions of Kurt Vonnegut's *Cat's Cradle*, a novel typically associated with the nuclear anxieties of the Cold War through its depiction of the scientific creation and apocalyptic consequences of the fictional *ice-nine*. The 2008 Penguin edition contains a new Introduction by Benjamin Kunkel that serves to frame the novel in terms that are particularly apposite to anthropogenic climate change. By suggesting that the 'nervous and nauseated hilarity' of the novel be understood as a self-conscious awareness of the impossibility of finding 'a correct tone to the end of the world',[123] Kunkel gestures towards the difficulties of representing anthropogenic climate change. Moreover, he specifically affirms the relevance of the novel to contemporary dangers such as 'global warming'.[124]

The cover of this recent edition is also notable. Although a survey of earlier editions reveals a range of imagery inspired by the multitude of themes to which the novel alludes, images of nuclear weapons – such as that found on the 1973 Penguin cover - exemplify the tradition of packaging the novel as a specifically atomic allegory [*Figure 3*]. But the 2008 cover packages the novel with an assemblage of images containing fragments of *ice-nine* inspired molecular structures, open skies, and what appears to be cut-up photographs of clouds that may or may not be taken from images of nuclear tests [*Figure 4*]. This imagery blurs the distinction between the eras of atomic anxiety and anthropogenic climate by alluding to both the novel's traditional reading as an allegory of atomic anxieties, and a subtle but powerful reframing of these anxieties as a concern for the geologic agency of industrial modernity.

Figure 3: 1973 cover of *Cat's Cradle*

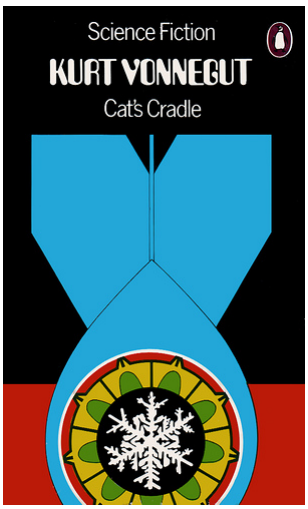
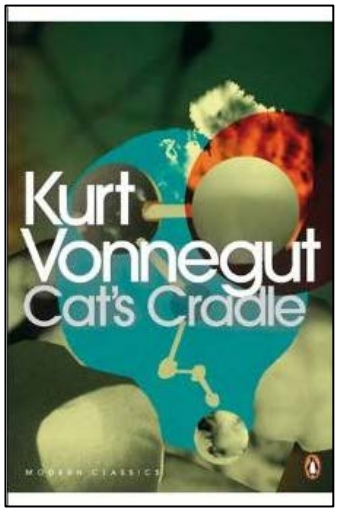


Figure 4: 2008 cover of *Cat's Cradle*



Whilst the paratextual function of these choices of cover art and commentary can be partly understood as a marketing device intended to re-frame older works by major authors within the context of a particularly contemporary theme, the publishers do draw upon and foreground aspects of the text that were already present. This is not to say that publishers should stand as arbiters of how a text is to be interpreted however. Indeed, by posthumously reframing texts by established western authors in this way, the publishers concerned might appear to be privileging a western-centric – and indeed Anglophone – literary tradition as a way of understanding this crisis.[125] But this apparent privileging is also concomitant with my focus upon literary depictions of the specifically consumerist subjects of industrial modernity who benefit from and maintain the cultures of consumption that are so heavily implicated in anthropogenic climate change. Whilst my selection of these early texts may therefore appear to re-affirm the authority of the dominant western publishing industry to bestow literary significance upon particular genres, authors, or individual texts, this effect is a by-product of my particular focus upon the core of global capital.

Yet it remains the case that whilst the contemporary causes of anthropogenic climate change are most closely associated with the centre of industrial modernity, the global effects are disproportionately felt at the periphery.[126]

It is also significant that the paratextual matter discussed above does not exist in isolation from the texts. Genette himself noted that the biographical interpretation of Proust's *À la recherche du temps perdu* is not 'wholly illegitimate', even if it is reinforced 'surreptitiously' by the cover photographs he describes.[127] The way in which novels such as *The Drowned World* or *Cat's Cradle* are open to re-framing as fictions of climate change is similarly legitimate, as we shall see. Indeed, this legitimacy underlines how these novels confront those same dominant anthropocentric assumptions about the privileging of human subjects in relation to the biosphere and the faith in technoscientific power over nature that concern theorists such as Latour and historians such as Chakrabarty.

The Later Texts

By tracing how earlier texts by Ballard and Vonnegut help readers to think through and beyond these concerns, the thesis develops a literary critical frame of reference within which to understand two more recent texts – Cormac McCarthy's *The Road* and Ian McEwan's *Solar* – that have been published in the context of increased public consciousness of anthropogenic climate change. Both of these novels were immediately associated with a literary response to climate change by commentators, and were identified as exemplifying an urgent concern for how this crisis is represented and understood. *The Road* for example was described by George Monbiot as 'the most important environmental book ever written',[128] whilst Andrew O'Hagan called it 'the first great masterpiece of the globally warmed generation'.[129] As Hannah Stark notes, the latter quote features prominently in the novel's marketing and on the cover of subsequent re-prints.[130]

Yet despite *The Road*'s depiction of the familiar spectacle of environmental destruction, its apocalyptic narrative is more significant for the way in which it serves to *defamiliarise* the human relationship with the biosphere in a similar way to the earlier Ballard texts. In particular, the novel's concern for disrupting anthropocentric accounts of space and time through the experiences of the central character provide a more profound representation of the Anthropocene than a more superficial focus upon the novel's depiction of a damaged environment might suggest. It is by reading the novel in light of the critical framework developed in my reading of the apocalyptic space-time of the Ballard texts that we can understand how *The Road* registers a particularly inventive rethinking of the human within the biosphere.

Like *The Road*, *Solar* has been widely interpreted as an example of an emerging literary response to anthropogenic climate change, being described as McEwan's 'long awaited climate

change novel'.[131] Yet unlike *The Road*, McEwan's text does not depict an overtly apocalyptic setting, and is written in a densely comic tone that contrasts markedly with the sparse bleakness of McCarthy's novel. That two novels with such different style and content should both be framed as examples of the 'climate change novel' is itself instructive. Such framing hints both at an expectation that contemporary fiction will turn towards anthropogenic climate change as an area of urgent literary representation, and an uncertainty as to what such representation might look like.

As the only novel in the thesis to explicitly name anthropogenic climate change within the text – yet which is also the only text not to offer a dramatically altered future history – *Solar* might appear to approach the crisis merely as a contextual setting that serves to establish a sense of timeliness. This is a view expressed by some critics and commentators.[132] However, the novel exemplifies the concern for the uses to which science is put in seeking to meaningfully explain and intervene in the biosphere that I develop in the analysis of *Cat's Cradle* and *Galapagos*. Indeed, *Solar* draws upon similar techniques to that of the earlier Vonnegut texts; its use of narrative focalisation in its depiction of science and scientist characters reveals the ironic distance between a supposedly objective scientific understanding of the biosphere and the naturalised desire to over-consume its resources. As my close analysis of the text suggests, this technique serves to elucidate the imaginary relationship with the biosphere that the novel's central scientist character reproduces, and which misleads that character's understanding of the Anthropocene with potentially apocalyptic consequences.

Whilst each of the six texts selected for close textual analysis in this thesis has been chosen because of the ways in which it exemplifies concerns for how the human subject of industrial modernity imagines themselves in relation to the biosphere, the specific selection of texts from the US and the UK might also suggest that this study lends itself to a comparative analysis of how different national literary traditions accomplished this intervention. The significance of such traditions is hinted at in several places in this thesis; the reading of *The Road* for example identifies how that text mobilises the conventions of the American Road novel in its depiction of an apocalyptic space-time. But these conventions are not mobilised in a straightforward way; they rather serve to further disrupt prevailing understandings of the 'nation' as a concept in light of the insights offered by the Anthropocene. A similar disruption of 'nation' is also identified in Ballard's *Hello America*, a novel by a British author often associated with a preoccupation with American culture as it is experienced globally. The text traces the main character's idea of America, an idea that is only ever understood by him through several narrative traditions of various 'American Dreams', and which is ultimately revealed to be purely imaginary in the context of massive biospheric changes. It is in the examination of these two texts that I

therefore pay particular attention to national literary conventions, but as a subversive function of the texts rather than comparatively.

By focusing on literary texts from the core of the global system of capital, and in particular texts by male British and American authors, the scope of this study may also seem limited in its approach to what is a global crisis with potentially complex implications for existing power relations of gender, race, and sexuality. In common with other areas of critical responses to anthropogenic climate change in literature, approaches to how writers who are not white, straight and male offer differing perspectives on the crisis are as yet largely in their infancy.[133] Yet perhaps the most urgent area of enquiry that has been subject to recent critical attention is that of the unequal ways through which anthropogenic climate change unfolds and is experienced globally. These inequalities come into focus around the open questions of the Anthropocene itself, in which understanding the unfolding of globalisation alongside an understanding of geologic history presents what Chakrabarty has more recently described as a 'disjuncture' between an account of 'anthropological differences' across societies on the one hand and a 'universalist-Enlightenment' view of humanity as a homogenous species on the other.[134] Clearly, the texts chosen for this study imagine 'humanity' from the perspective of an historically and economically specific 'society'; Western, Anglophone, post-industrial and consumerist. But this specificity does not necessarily re-inscribe a universalising view of the human. Rather, it is in tracing how the speculative literary thought experiments of these texts assist us in thinking 'disjunctively about the human'[135] that this thesis demonstrates how literary fiction can disclose the misleadingly anthropocentric – and universalising – assumptions that structure understandings of the relationship between the human species and the biosphere within the centre of industrial modernity.

Indeed, how texts written from this centre help to reveal the misleading assumptions that serve to sustain that modernity in its present form is central to the focus of this thesis. But literary representations of the different perspectives offered by the experiences of this crisis from outside of this centre are beyond the scope of the present thesis. Notable examples of other recent scholarship that has examined such perspectives include Upamanyu Pablo Mukherjee's *Postcolonial Environments: Nature, Culture and the Contemporary Indian Novel in English* (2010) which examines the representation of the anthropogenic and postcolonial environment of India in recent novels;[136] and the collection of essays edited by Elizabeth DeLoughrey and George B. Handley under the title *Postcolonial Ecologies: Literatures of the Environment* (2011).[137] Further examples can be found in the essays in a 2010 collection *Postcolonial Green: Environmental Politics and World Narratives* edited by Bonnie Roos and Alex Hunt, in particular the analysis by Mukherjee of Arundhati Roy's response to the 'historically specific condition of uneven development in India' in her 1997 novel *The God of Small Things*.[138]

Structure of the Thesis

The thesis is structured over two sections, each of which contains three case-studies. The first section analyses how literary fiction can re-imagine environmental apocalypse as a means of foregrounding and exploring the limits of anthropocentric thinking in the Anthropocene. The second section examines how the literary representation of science and scientists reveals how this thinking dangerously conceals the limits and potentially apocalyptic dangers of technoscience in intervening in the Anthropocene. Each section begins with an analysis of two of the late twentieth century texts before turning to an analysis of one of the early twenty-first century texts. In taking this approach, I suggest that the representations of both environmental disaster and of science and scientists in the earlier texts can illuminate the implications of the Anthropocene that are taken up in the contemporary texts.

The first section opens with an examination of the apocalyptic transformation of the environment in J. G. Ballard's *The Drowned World* and *Hello America* that focuses in particular on how each novel presents a journey into an apocalyptically transformed environment. I identify key examples of how these transformations are relayed in the text – through biological imagery and evolutionary allusion in *The Drowned World*, and through the imagery and myths of the American Dream in *Hello America* – that inventively associates human histories of modernity with the geological history of the biosphere. With reference to Heidegger's account of anthropocentrism, I suggest that this association complicates the anthropocentric privileging of humans.

From this foundation, I identify how the de-privileged relationship between humans and the biosphere in both novels can help readers to think through the ways in which they are encouraged to 'reproduce' the conditions of modernity. Through close analysis of Ballard's specific and distinctive use of central characters as focalising agents, I identify how their journeys are framed as traumatic encounters with the real conditions of the biosphere that disrupt and confound the human histories that have previously mediated those characters' understanding of their relationship to the biosphere. As I argue, this technique of narrative focalisation disrupts the smooth repetition of the anthropocentric foundations of industrial modernity that represses the understanding of the relationship between humanity and the biosphere.

Building upon this way of reading apocalyptic climate fiction as a critique of the anthropocentric foundations of industrial modernity, Chapter 2 examines the apocalyptic transformation of the environment presented in Cormac McCarthy's *The Road*. I begin by assessing a possible limitation of reading apocalyptic fiction as a critique of anthropocentrism; namely the anthropocentric subtext of an apocalyptic 'end' that is implied by critics such as Frank

Kermode. By comparing this work to that of Jacques Derrida, I highlight an alternative mode of apocalyptic literature that helps us to understand the ways in which McCarthy registers a particularly distinctive apocalyptic 'end' to the anthropogenically transformed space-time of the Anthropocene. The distinctiveness of this approach is identified through a close analysis of the text's fragmented re-imagining of the American literary chronotope of the road, the traumatic experience of one of its main characters, and a self-conscious rejection of the salvational promise of apocalypse. I conclude that these techniques serve to frame the text's apocalypse as non-anthropocentric, and so provide a powerful means of speculatively thinking through a post-human 'world without a biosphere'.

Having identified how apocalypse provides a way for literary fiction to complicate the anthropocentric thinking that obscures the complex interdependencies of human and biosphere in the Anthropocene, the second section of the thesis examines how fiction can critique the uses to which science can be put in both resisting and replicating such thinking. Chapter 3 begins with a reading of Kurt Vonnegut's *Cat's Cradle* that identifies how that novel mobilises narrative irony to draw attention to a facile belief in the promise of technoscience to intervene in the biosphere. I go on to trace the ironic distance between such belief and the narrator's own view of complex interconnections from which the novel's environmental apocalypse ultimately proceeds. I suggest that this complexity marks the novel's ironic questioning of technoscientific power over nature and undermines the faith in this power that is exemplified by its scientist character. The apocalyptic outcome of this misplaced faith presents, I suggest, a profound prefiguring of how anthropogenic climate change has proceeded from complex interactions between individuals, technoscientific societies, and the biosphere.

In order to better understand this complexity I then conduct an analysis of how it is revealed by scientific accounts of the biosphere. Specifically, I consider how ecological and evolutionary science has provided a complex view of the relationship between human and biosphere that disrupts some of the same anthropocentric assumptions with which this thesis is concerned. But I also identify the dangers of instrumentalising science in facile 'appeals to nature', and suggest that an important role for science lies in offering stories that intrude upon the habits of thought that I have been describing in terms of the anthropocentric foundations of ideology. I go on to suggest that literary fiction provides particular ways of helping us to think through such stories and their implications.

It is just such a task that is taken up in Vonnegut's representation of the relationship between humanity and the biosphere in *Galapagos*. In reading this text in light of my discussion of science, I identify how the text represents the human brain as a physiological metonym for the historical and biological causes of the Anthropocene, and how this metonym functions to destabilise the valorising of human intelligence associated with accounts of human evolution.

Through a close reading of the narrator's depiction of this 'brain', I suggest that the novel imaginatively inverts and complicates specific and dominant understandings of the human subject. I then go on to analyse how these understandings are further interrogated through the narrator's evolutionary perspective on human history. This perspective crucially blurs the distinction between human subject and biosphere, yet continues to be inscribed with the anthropocentric assumptions of the narrator himself. In tracing this apparent contradiction, I identify the ways in which the text draws attention to the limits and dangers of making use of scientific knowledge as a means of claiming an ultimate metaposition from which to describe the human relationship with the biosphere.

Chapter 4 takes-up this concern with the limitations of finding an adequate technoscientific response to the Anthropocene through a close reading of the representation of both the scientific and consumerist impulses of the main scientist character in Ian McEwan's *Solar*. I identify how this character principally functions as an allegorical figure, whose unconscious repetition of damaging acts of consumption – most notably of food – highlights and critiques the paradox of a consumer-driven industrial modernity that continues to pursue damaging exploitation of the biosphere despite possessing sufficient scientific knowledge to recognise its dangerous consequents.

Through close reading of key scenes, I identify how this allegorical role is relayed by the text through the narrative distance between the third person narrator and the focalising character of the scientist. I argue that this distance serves to foreground the contradiction between the scientist's espoused scientific objectivity and his participation in an explicitly 'worldly' science, and that through this contradiction the novel speculates upon the limits of technoscience as a means of intervening in the Anthropocene. Indeed, I suggest that *Solar* ultimately demonstrates how such intervention embodies the very same misleading anthropocentric impulses and assumptions that were revealed to have apocalyptic implications in the earlier chapters of the thesis. I conclude by proposing that whilst disclosing the difficulties of non-anthropocentric thinking, the text also offers a way of understanding human subjects as a co-created cause and effect of the Anthropocene.

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[1] Fred Hoyle, *The Black Cloud* (London: Penguin, 2010), p. 110.
[2] *The Day After Tomorrow*, dir. by Roland Emmerich (20th Century Fox, 2004).
[3] *Independence Day,* dir. by Roland Emmerich (20th Century Fox, 1996).
[4] *Godzilla*, dir. by Roland Emmerich (Columbia Pictures, 1998).
[5] *2012*, dir. by Roland Emmerich (Sony Pictures, 2009).
[6] Whilst the climate change of *The Black Cloud* is not anthropogenic, the cloud's sentiency does lend an anthropomorphic quality to its interactions with the biosphere.

[7] See for example such varied examples as: John Wyndham's *The Day of the Triffids* (1951); Christopher Nolan's film *Interstellar* (2014); Steven Spielberg-produced TV series *Terra Nova* (2012). Whilst differing in many respects to each other, the threat to human power over nature, and the ultimate restoration of that power, is framed and relayed through depictions of apocalypse and science in these examples.
[8] Karen Pinkus, 'From The Editor: Climate Change Criticism', *diacritics*, 41 (2013), 3-4 (p. 3) <http://dx.doi.org/10.1353/dia.2013.0017>.
[9] Timothy Clark, 'Some climate change ironies: deconstruction, environmental politics, and the closure of ecocriticism', *Oxford Literary Review*m, 32 (2010), 131-49 (p. 144) <http://dx.doi.org/10.3366/olr.2010.0009>.
[10] See for example Dr David Levinson in *Independence Day*, Dr Niko Tatopoulos in *Godzilla*, and Dr Adrian Helmsley in *2012.*
[11] Clark, p. 144.
[12] Bruno Latour, 'How to make sure Gaia is not a God of Totality? With special attention to Toby Tyrrell's book On Gaia', *The Thousand Names of Gaia, from the Anthropocene to the Age of the Earth*, (2014), p. 18 <http://www.bruno-latour.fr/sites/default/files/138-THOUSAND-NAMES.pdf> [accessed 24 January 2015].
[13] Donna J. Haraway, *When Species Meet: Posthumanities* (Minneapolis, MN: University of Minnesota Press, 2008), p. 16.
[14] Hoyle, p. 126.
[15] Margaret Atwood, 'Rachel Carson's Silent Spring, 50 years on', *Guardian*, 7 December 2012 <http://www.theguardian.com/books/2012/dec/07/why-rachel-carson-is-a-saint> [accessed 5 December 2014].
[16] Donna Haraway, *Anthropocene, Capitalocene, Chthulucene: Staying with the Trouble*, online video recording, Vimeo, 8 June 2014, <https://vimeo.com/97663518> [accessed 4 March 2015].
[17] Paul J. Crutzen and Eugene F. Stoermer, 'The Anthropocene', *Global Change Newsletter*, 41 (May 2000), 17–18 <http://www.igbp.net/download/18.316f18321323470177580001401/1376383088452/NL41.pdf> [accessed 31 January 2016].
[18] William F. Ruddiman, 'The Anthropogenic Greenhouse Era Began Thousands of Years Ago', *Climatic Change*, 61 (2003), 261-93 <http://dx.doi.org/10.1023/B:CLIM.0000004577.17928.fa>.
[19] Indeed, some scientists have expressed concern that the Anthropocene lacks the rigorous definition applied to existing geological epochs. See for example P. L. Gibbard and M.J.C. Walker, 'The term "Anthropocene" in the context of formal geological classification', *Geological Society, London, Special Publications,* 395 (2014), 29-37 <http://dx.doi.org/10.1144/SP395.1>.
[20] William F. Ruddiman, for example, locates the start of Anthropocene with the beginning of agriculture. More recently, Simon Lewis and Mark Maslin have proposed the specific dates 1610 and 1964 as possible candidates for the point at which human activity obtained the distinct geologic agency of the Anthropocene. See Simon L. Lewis and Mark A Maslin, 'Defining the Anthropocene', *Nature*, 519 (2015), 171-80 <http://dx.doi.org/0.1038/nature14258>.
[21] Louise Squire, 'Death and the Anthropocene: Cormac McCarthy's World of Unliving', *Oxford Literary Review*, 34 (2012), 211-28 (p. 211) <http://dx.doi.org/10.3366/olr.2012.0042>.
[22] Pinkus, p. 3.
[23] Adam Trexler, *Anthropocene Fictions: The Novel in a Time of Climate Change* (Charlottesville, VA: University of Virginia Press, 2015). Kindle ebook.
[24] *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch*, ed. by Clive Hamilton, Christophe Bonnueil, and François Gemenne (London: Routledge, 2015).
[25] Isabelle Stengers, 'Gaia, the Urgency to Think (and Feel)', *The Thousand Names of Gaia, From the Anthropocene to the Age of the Earth*, (2014), p. 2 <https://osmilnomesdegaia.files.wordpress.com/2014/11/isabelle-stengers.pdf> [accessed 25 January 2015].

[26] Isabelle Stengers, Heather Davis, and Etienne Turpin, 'Matters of Cosmopolitics: on the Provocations of Gaïa', in *Architecture in the Anthropocene: Encounters Among Design, Deep Time, Science and Philosophy*, ed. by Etienne Turpin (Ann Arbor, MI: Open Humanities Press, 2013) <http://dx.doi.org/10.3998/ohp.12527215.0001.001>.
[27] Andreas Malm and Alf Hornborg, 'The geology of mankind? A critique of the Anthropocene narrative', *The Anthropocene Review*, 1 (2014), 62-9 <http://dx.doi.org/10.1177/2053019613516291>.
[28] Haraway, *Anthropocene, Capitalocene, Chthulucene.*
[29] Slavoj Žižek, *Living in the End Times* (London: Verso, 2011), pp. 333-35.
[30] Though Haraway herself also points out that identifying some of the 'historical specificities' and limitations of the Anthropocene is not a reason to abandon it. See Haraway, *Anthropocene, Capitalocene, Chthulucene*.
[31] Crutzen and Stoermer, p. 18.
[32] Ruddiman, 'The Anthropogenic Greenhouse Era Began Thousands of Years Ago', pp. 261-93.
[33] Tim Flannery has described the 'long summer' – the particular climatic conditions since the end of the last ice age – as 'without doubt *the* crucial event in human history'. For a concise account of how human history has been contingent upon this climate history, see his chapter 'The Long Summer', in Tim Flannery, *We Are the Weather Makers: The Story of Global Warming* (London: Penguin, 2007). Kindle ebook.
[34] This aphorism is credited to Bill Clinton's political consultant James Carville, See David Maraniss, 'A Paper's Political Afterlife', *Washington Post*, 3 August 1992 <http://www.washingtonpost.com/archive/politics/1992/08/03/a-papers-political-afterlife/557c5e55-46cb-424e-9c01-5b8da6015563/> [accessed 16 August 2015].
[35] For further recent critiques, see also: Timothy Morton, 'How I Learned to Stop Worrying and Love the Term Anthropocene', *The Cambridge Journal of Postcolonial Literary Inquiry*, 1 (September 2014), 257-264 <http://dx.doi.org/10.1017/pli.2014.15>; and Clive Hamilton, Christophe Bonneuil and François Gemenne, 'Thinking the Anthropocene', in *The Anthropocene and the Global Environmental Crisis: Rethinking Modernity in a New Epoch*, ed. by Clive Hamilton, Christophe Bonnueil, and François Gemenne, (London: Routledge, 2015), pp. 1-13.
[36] Dipesh Chakrabarty, 'The Climate of History: Four Theses', *Critical Inquiry*, 25 (Winter 2009), 197-222.
[37] Naomi Oreskes, 'The Scientific Consensus on Climate Change: How Do We Know We're Not Wrong?', in *Climate Change: What It Means for Us, Our Children, and Our Grandchildren*, ed. by Joseph F. C. DiMento and Pamela Doughman (Cambridge, MA: MIT Press, 2007), pp. 65-99 (p. 93).
[38] Chakrabarty describes biologic agency as the condition of humans as biological organisms within the biosphere, and geologic agency as the condition of humans as a species able to influence the biosphere itself. See Chakrabarty, 'The Climate of History', p.206.
[39] I will be using the term 'geologic history' henceforth to refer to Chakrabarty's concept of 'deep', 'species', or 'geologic' history. This is the history of humans and the biosphere along geological timescales, which includes but is not limited to traditional 'geological' history.
[40] Chakrabarty, 'The Climate of History', p. 217.
[41] Chakrabarty, 'The Climate of History', p. 52.
[42] Chakrabarty, 'The Climate of History', p. 216.
[43] Indeed, as a historian Chakrabarty himself has contributed to postcolonial theory and subaltern, indigenous, and minority histories. See 'Dipesh Chakrabarty', <https://history.uchicago.edu/directory/dipesh-chakrabarty> [accessed 4 December 2014].
[44] J. G. Ballard, *The Drowned World* (London: Harper Perennial, 2006).
[45] Kurt Vonnegut, *Galapagos* (London: Flamingo, 1994).
[46] Isabelle Stengers, 'Gaia, the Urgency to Think (and Feel)', p. 9. Stengers is describing a specifically 'science fiction' form of novel, but identifies this 'science fiction' with Donna Haraway's multifaceted readings of 'science fiction'.

[47] Martin Heideggar, 'The Question Concerning Technology', in *The Question Concerning Technology and Other Essays*, trans. by William Lovitt (New York, NY: Garland Publishing, 1977), pp. 3-35 (p. 9-10).
[48] Ruth Irwin, *Heidegger, Politics and Climate Change: Risking It All* (London: Continuum International Publishing, 2008), p 174.
[49] Atwood, 'Rachel Carson's Silent Spring, 50 years on'.
[50] Paul Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age* (London: The University of North Carolina Press, 1994), p. xx.
[51] J. G. Ballard, *Hello America* (London: Harper Perennial, 2008).
[52] Louis Althusser, 'Ideology and Ideological State Apparatuses (Notes towards an investigation)', in *Mapping Ideology*, ed. by Slavoj Žižek (London: Verso, 1994), pp.100-40 (p. 123).
[53] *The Seminar of Jacques Lacan: Book XI The Four Fundamental Concepts of Psychoanalysis*, ed. by Jacques-Alain Miller, trans. by Alan Sheridan (New York, NY: W. W. Norton & Company, 1998), p. 53.
[54] *The Seminar of Jacques Lacan*, p. 55.
[55] Michael Rothberg, *Traumatic Realism: The Demands of Holocaust Representation* (Minneapolis, MN: University of Minnesota Press, 2000), p. 137.
[56] Helmut Pfeiffer, 'Traumatic Memory: Claude Simon's *La Route de Flandres*', in *Representations of Emotional Excess*, ed. by Jürgen Schlaeger, Real: Yearbook of Research in English and American Literature, 16 (Tübingen: Gunter Narr Verlag, 2000), pp. 271-86 (p.283).
[57] Claire Colebrook, *Gilles Deleuze: Essential Guides for Literary Studies* (London: Routledge, 2002), p. 92.
[58] Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. By Brian Massumi (London: Continuum, 1987), p. 11,
[59] Colebrook, p. 128.
[60] Bruno Latour, 'Why Has Critique Run Out of Steam? From Matters of Fact to Matters of Concern', *Critical Inquiry*, 30 (Winter 2004), 225-48 (p.238) <http://dx.doi.org/10.1086/421123>.
[61] Latour, 'Why Has Critique Run Out of Steam?' p. 242.
[62] Latour, 'Why Has Critique Run Out of Steam?' p. 246.
[63] Latour, 'Why Has Critique Run Out of Steam?' p. 246.
[64] Steven Shapin, 'Science and the Modern World', in *The Handbook of Science and Technology Studies*, ed. by Edward J. Hackett, Olga Amsterdamska, and Michael E. Lynch, 3rd edn (Cambridge, MA: MIT Press, 2007), pp. 433-48 (p. 440).
[65] Steve Sailor, 'Q&A: Steven Pinker of "Blank Slate"', <http://pinker.wjh.harvard.edu/books/tbs/media_articles/2002_10_30_upi.html> [accessed 10th December 2013].
[66] Shapin, 'Science and the Modern World', pp. 441-2.
[67] Shapin, 'Science and the Modern World', p. 442.
[68] Shapin, 'Science and the Modern World', p. 442.
[69] Shapin, 'Science and the Modern World', pp. 442-3.
[70] Shapin, 'Science and the Modern World', p. 443.
[71] Shapin, 'Science and the Modern World', p. 443.
[72] Shapin, 'Science and the Modern World', p. 443.
[73] Cheryll Glotfelty, 'Introduction', in *The Ecocriticism Reader: Landmarks in Literary Ecology*, ed. by Cheryll Glotfelty and Harold Fromm (Athens, GA: University of Georgia Press, 1996), pp. xv-xxxv (pp. xviii-xix).
[74] Greg Garrard, *Ecocriticism*, 2nd edn (Oxford: Routledge, 2012), p. 5.
[75] See Garrard pp. 1-16 for a concise account of how ecocriticism has developed in recent years.
[76] Andrew Dobson, 'The fiction of climate change', <http://www.opendemocracy.net/andrew-dobson/fiction-of-climate-change> [accessed 22 October 2010].

[77] Adam Trexler and Adeline Johns-Putra, 'Climate Change in Literature and Literary Criticism', *WIREs Climate Change*, 2 (2011), 185-200 (p. 186) <http://dx.doi.org/10.1002/wcc.105>.
[78] Adam Roberts, *Science Fiction* (London: Routledge, 2000), pp. 2-3.
[79] Rob Latham, 'Biotic Invasions: Ecological Imperialism in New Wave Science Fiction', *The Yearbook of English Studies*, 37 (2007), 103-19 (pp. 113-4) <http://dx.doi.org/10.2307/20479304>.
[80] This is a common collective term for Ballard's first four novels: *The Wind from Nowhere* (1961); *The Drowned World* (1962), *The Drought* (1965); and *The Crystal World* (1966).
[81] Roger Luckhurst, *Science Fiction* (Cambridge: Polity, 2005), p. 170.
[82] Luckhurst, *Science Fiction*, p. 170.
[83] Ernest Mandel, *Late Capitalism*, trans. by Joris de Bres (London: Verso, 1975), p. 501. Italics mine.
[84] In particular, Mandel highlights the emphasis on 'technical' solutions to the resolving of contradictions and draws upon Leo Kofler's account of 'technological rationality', which includes individuals increasingly consenting to ideological subjugation through the provision of technological production and consumption; see Mandel, p. 501. Both of these tendencies are of pressing relevance to the Anthropocene, as we shall see later.
[85] T. C. Boyle, *A Friend of the Earth* (London: Bloomsbury, 2000). Kindle ebook.
[86] Whilst sometimes labelled as a science fiction writer, Atwood distances herself from this term and describes the novel as 'an adventure romance […] coupled with a Menippean satire, the literary form that deals with intellectual obsession'. See Margaret Atwood, 'The Handmaid's Tale and Oryx and Crake "In Context"', *PMLA*, 119 (2004), 513-17 (p. 517) <http://www.jstor.org/stable/25486066> [accessed 13th May 2015].
[87] Cormac McCarthy, *The Road* (London: Picador, 2006).
[88] Ian McEwan, *Solar* (London: Jonathan Cape, 2010).
[89] Elisabeth Schäfer-Wünsche, 'Borders and Catastrophes: T. C. Boyle's Californian Ecology', in *Space in America: Theory, History, Culture*, ed. by Klaus Benesch and Kerstin Schmidt (Amsterdam: Rodopi, 2005), pp. 401-17 (p.411-15).
[90] Nils Zumbansen and Marcel Fromme, 'Ecocatastrophes in Recent American (non-) Fictional Texts and Films', in *Local Natures, Global Responsibilities: Ecocritical Perspectives on the New English Literatures*, ed. by Laurenz Volkmann, Nancy Grimm, Ines Detmers, and Katrin Thomson (Amsterdam: Rodopi, 2010), pp. 274–87 (p. 285).
[91] Trexler and Johns-Putra, pp. 189-90.
[92] Adam Trexler, *Anthropocene Fictions*, location 407 of 5678.
[93] Adam Trexler, *Anthropocene Fictions*, location 291 of 5678.
[94] Squire, p. 225.
[95] Jason Groves, 'Goethe's Petrofiction: Reading the *Wanderjahre* in the Anthropocene', *Goethe Yearbook*, 22 (2015), 95-113 <http://dx.doi.org/ 10.1353/gyr.2015.0018>.
[96] Timothy Clark, 'Derangements of Scale', *Telemorphosis: Essays in Critical Climate Change*, ed. by Tom Cohen and Henry Sussman (Ann Arbor, MI: Open Humanities Press, 2012) <http://dx.doi.org/10.3998/ohp.10539563.0001.001> p. 153.
[97] Clark, 'Derangements of Scale', p. 154.
[98] Clark, 'Derangements of Scale', p. 155.
[99] Clark, 'Derangements of Scale', p. 161.
[100] Clark, 'Derangements of Scale', p. 159.
[101] In his later '*The Ecological Thought*', Morton specifically uses 'Nature' rather than 'nature' to remind readers of the paradoxically 'unnatural' qualities it encompasses. See Timothy Morton, *The Ecological Thought* (Cambridge, MA: Harvard University Press, 2010), p. 3.
[102] Timothy Morton, *Ecology Without Nature: Rethinking Environmental Aesthetics* (Cambridge, MA: Harvard University Press, 2009), p. 13.
[103] Morton, *Ecology Without Nature*, p. 19.
[104] Morton, *Ecology Without Nature*, p. 17.
[105] Morton, *Ecology Without Nature*, p. 23.

[106] Morton, *The Ecological Thought*, p. 3.
[107] Morton, *The Ecological Thought*, p. 7.
[108] Morton, *The Ecological Thought*, p. 8.
[109] Morton, *The Ecological Thought*, p. 29.
[110] However, it should also be noted that Morton himself has taken a somewhat ambivalent stance towards the value of the 'Anthropocene' as a concept in general, and as a critical tool in particular. See for example Timothy Morton, 'How I Learned to Stop Worrying and Love the Term Anthropocene', *The Cambridge Journal of Postcolonial Literary Inquiry*, 1 (2014), 257-264 <http://dx.doi.org/10.1017/pli.2014.15>.
[111] Morton, *The Ecological Thought*, p. 10.
[112] Morton, *The Ecological Thought*, p. 29.
[113] Morton, *The Ecological Thought*, p. 21.
[114] Morton, *The Ecological Thought*, p. 15.
[115] Morton, *The Ecological Thought*, p. 18.
[116] Pinkus, p. 3.
[117] Kurt Vonnegut, *Cat's Cradle* (London: Penguin, 2008).
[118] Latham, p. 107.
[119] J. G. Ballard, *The Drowned World* (London: Harper Perennial, 2008), front cover.
[120] Will Self, 'Introduction', in *The Drowned World*, J. G. Ballard (London: Fourth Estate, 2014).
[121] Gerard Genette, *Paratexts: Thresholds of Interpretation*, trans. by Jane E. Lewin (Oxford: Oxford University Press, 1997).
[122] Gennete similarly describes how the choice of photographs of Marcel Proust used on the cover of a 1954 edition of *À la recherche du temps perdu* encourage readers to associate the ageing of the author with the aging of the novel's narrator. This, Genette suggests, has the effect of drawing the reader towards an autobiographical interpretation of the novel. See Gennete, pp. 30-1.
[123] Benjamin Kunkel, 'Introduction', in *Cat's Cradle*, Kurt Vonnegut (London: Penguin, 2008), pp. i-xiii (p.vi).
[124] Kunkel, p.xii.
[125] Indeed, by re-contemporizing these texts the publishers effectively seek to place them outside of what Pascale Casanova has called the 'bidding of time'. In so doing, the texts are granted a form of 'classical' status that Casanova associates with the core 'literary capitals' of the global literary marketplace. See Pascale Casanova, *The World Republic of Letters*, trans. by M. B. DeBevoise (Cambridge, MA: Harvard University Press, 2004), pp. 91-2.
[126] Important novelists from the 'periphery' who have written about this disproportionate experience of the environmental consequences of industrial modernity include Indra Sinha, whose *Animal's People* (2007) re-imagines the Bhopal disaster; and Helom Habila, whose *Oil on Water* (2010) deals with unregulated oil extraction in the Nigerian Delta.
[127] Gennete, p. 31.
[128] George Monbiot, 'Civilisation ends with a shutdown of human concern. Are we there already?', *Guardian*, 30 October 2007 <http://www.guardian.co.uk/commentisfree/2007/oct/30/comment.books> [accessed 27 October 2009].
[129] There appears to be no direct reference to O'Hagan's quote outside of editions of the novel itself, associated marketing material, and discussions of these sources by critics.
[130] Hannah Stark, '"All These Things He Saw and Did Not See": Witnessing the End of the World in Cormac McCarthy's *The Road*', *Critical Survey*, 25 (2013), 71-84 (p. 83) <http://dx.doi.org/10.3167/cs.2013.250206>.
[131] Trexler and Johns-Putra, p. 190.
[132] Andrew Dobson for example has suggested that *Solar* is 'more a mid-life-crisis novel with climate-change as a backdrop than one "about" climate change'. See Dobson, 'The fiction of climate change'.
[133] Trexler has recently drawn attention to the need for further research into the differing experiences of the Anthropocene 'by individuals of different genders, sexual orientations, racial

and cultural origins, and religious affiliations'. See Trexler, *Anthropocene Fictions*, location 4626 of 5678.

[134] Dipesh Chakrabarty, 'Postcolonial Studies and the Challenge of Climate Change', *New Literary History*, 43 (Winter 2012), 1-18 (p. 2) <http://dx.doi.org/10.1353/nlh.2012.0007>.

[135] Chakrabarty, 'Postcolonial Studies and the Challenge of Climate Change', p.2.

[136] Upamanyu Pablo Mukherjee, *Postcolonial Environments: Nature, Culture and the Contemporary Indian Novel in English* (Basingstoke: Palgrave Macmillan, 2010).

[137] Elizabeth DeLoughrey and George B. Handley, *Postcolonial Ecologies: Literatures of the Environment* (Oxford: Oxford University Press, 2011).

[138] Upamanyu Pablo Mukherjee, 'Arundhati Roy: Enviornment and Uneven Form', in *Postcolonial Green: Environmental Politics and World Narratives*, ed. by Bonnie Roos and Alex Hunt (Charlottesville, VA: University of Virginia Press, 2010), pp. 17-31 (p. 18).

Chapter 1: The Apocalyptic Imagining of the Anthropocene in J. G. Ballard's *The Drowned World* and *Hello America*

The interdependencies between humans and the biosphere, which until recently have been overlooked by accounts of the human history of modernity and which are moreover routinely obscured by the dominant assumptions that underpin that modernity, are imaginatively confronted by the main character in J. G. Ballard's *The Drowned World*. In an early chapter of the novel, this main character – a scientist called Kerans – reflects upon the consequences of global temperature rises for the fictional world he inhabits. The environmental conditions of this future world have transformed into those of 'the Triassic period',[1] in which global mean temperatures were approximately 6°C greater than they are today[2] in the Holocene epoch of the Quaternary period. As a consequence of these higher temperatures, all polar ice has melted, leading to a significant rise in sea levels. The cities have become inundated, and civilisation has moved north and south to the poles where the temperatures are still tolerable. The topologies of these former cities have been reshaped into swamps and lagoons. Plant and animal life has transformed into larger forms of existing species. In these new climatic conditions most of the planet is uninhabitable by humans.

In reflecting on these consequences, Kerans ruminates upon the impossibility of human civilisation continuing after such an apocalyptic change in climate. He is taking part in a combined military and scientific survey mission, the purpose of which is to map the drowned remains of an unnamed city in anticipation of its future re-occupation. But even the expedition's leader Colonel Riggs regards this 'hypothetical future' as 'absurd'.[3] Kerans too is sceptical of the possibility of recuperating the city, and the modernity of human civilisation that it represents. He regards the 'tacit assumptions' of a fictional future United Nations (UN) that they can preserve 'the same social and domestic relationships' that characterized this modernity as 'obviously fallacious'.[4] Noting that the 'mounting flood water and temperature' will not stop at the 'so-called polar redoubts',[5] Kerans concludes that humanity's interdependence upon the biosphere is such that it cannot resist the changes to the climate. Instead, Kerans asserts that a 'more important task than mapping the harbours and lagoons of the external landscape was to chart the ghostly deltas and luminous beaches of the submerged neuronic continents'.[6] With this statement, Kerans suggests that the transformation of the environment has not merely obsoleted the old practices of 'mapping' through which the UN seeks to preserve modernity; more significantly it also reveals something within or about humans that has been previously 'submerged'. The 'neuronic continents' Kerans describes refer to the theory of his colleague Dr Bodkin that the climatic changes have also triggered psychological changes in humans, and that the regression of the

biosphere to an earlier epoch is mirrored by the resurgence of ancient memories from what Bodkin calls 'archaeopsychic time'.[7] What is at stake here, Kerans implies, is a fundamental rethinking of humanity's place within a changing environment. In my analysis of *The Drowned World* in the first part of this chapter I suggest that the submerged continents of this archaeopsychic time represent a speculative vision of how human and geologic history might be entwined, and that the ancient memories of this time provide an imaginative way of exploring an emerging ecological consciousness of previously obscured relations between humans and the biosphere. In revealing this consciousness through the focalising agent of Kerans, I further suggest that the apocalypse depicted in the novel serves to elucidate the end of a specifically anthropocentric view of modernity in the face of climate change.

The Drowned World: The Apocalyptic Re-Birth of Humans and Nature

In order to better understand Kerans' somewhat opaque assertion that he must look inwards to 'chart the ghostly deltas and luminous beaches of the submerged neuronic continents'[8] we must understand how the text depicts such a consciousness of 'archaeopsychic time'[9] as being in conflict with the external 'mapping' of nature that the novel associates with a fictional UN. The significance of 'mapping', and the ways in which the text associates it with the submerging or obscuring of 'neuronic continents', is first hinted at by the cartographic language of Kerans' mission itself. In particular, by seeking to categorise and delineate the 'the harbours and lagoons' for the purposes of future human reoccupation, Kerans' mission is suggestive of an enframing of nature as a resource that is illuminated by Martin Heidegger's particular account of anthropocentrism. As we saw in the Introduction, Heidegger describes the 'essence of modern technology' as the 'enframing' of the world through technology such that everything is imagined in terms of its capacity to be exploited.[10] He illustrates this exploitation through the example of a hydroelectric plant on the Rhine, which transforms the river into a 'water power supply' so that its 'essence' now 'derives from out of the essence of the power station'.[11] In this way the river is enframed as a resource by the technology of the power plant. Similarly, we might begin understand Kerans' UN mission to 'map' the harbours and lagoons of the unnamed city as an attempt to re-assert the 'enframing' of nature as a resource for that city; Kerans' task is to re-imagine the harbours and lagoons in terms of the essence of the city itself.

This interpretation is illuminated further by Michael E. Zimmerman's observation that for Heidegger the 'technological epoch', which we might loosely associate with the technoscientific industrial modernity maintained in *The Drowned World* by the UN, is characterised by humans understanding nature 'as little more than raw material that is valuable solely because it can be used to enhance human power'.[12] This technologically-mediated vision of nature foregrounds the

power-use that lies behind the exploitation of nature – for example by the built environment of the city – and the apparent normalisation of the vision itself.[13] As Ruth Irwin also notes:

> The colonization of nature occurs through, as Heidegger puts it, the technological horizon, the rational engineering of all things as potential consumable resource. The problem with the technocratic, rationalist paradigm that puts humanity at the centre of the universe, is that, walled off from nature, it is all too easy for us to assume a relationship of exploitation. We lose our ability to situate ourselves as a part of our habitat.[14]

This 'technological horizon' determines a particular view of nature in what Irwin elsewhere describes as Gestell's 'all pervasive framework of thought'[15] through which 'people are relieved of their direct relation with ecology'.[16] In this way, Heidegger's analysis highlights a critically anthropocentric foundation upon which the exploitation of the natural world is rationalised and ultimately naturalised through technological modernity. This naturalisation in turn underpins the privileging of industrial modernity, as it encourages a position of assumed sovereignty over a nature that is both distinct from modernity and available for exploitation by it. Such assumed sovereignty is depicted in *the Drowned World* in the UN's project to map the new topography of the un-named city for re-occupation 'in some hypothetical future'.[17] The clear anthropocentric assumption of this project – what Kerans describes as the 'tacit assumptions'[18] of the UN – is that the harbours and lagoons are legitimate resources through which to enact the larger goal of preserving the 'social and domestic relationships'[19] of modernity.

The implications of this goal are important for understanding how Kerans perceives his mapping mission as being in opposition to the 'submerged neuronic continents' that come to concern him in the course of the novel. In 'relieving' people 'of their direct relation with ecology', the enframing of nature described by Heidegger suggests a process that obscures the ways in which humans remain a part of the biosphere, or how they exist as what Chakrabarty has more recently called biologic agents. This obfuscation is suggestive of a submersion of ecological consciousness that I would suggest is depicted in *The Drowned World* by the UN and its 'fallacious' project of seeking to preserve modernity in the face of a new climatic condition. As Zimmerman further notes, Heidegger's analysis anticipates, though not unproblematically, aspects of more recent Deep Ecology,[20] which draw attention to particular ways in which human individuals and societies view themselves in relation to nature. The danger of the anthropocentric viewpoint is that it assumes an intrinsic human superiority over nature that legitimises further exploitation, whilst simultaneously obfuscating the ways in which all humans exist as part of the biosphere.

One of the key points of convergence between Heidegger and 'Deep' Ecology is that the exploitation of nature is so embedded in the anthropocentric view of the world that 'only a basic shift in humanity's self-understanding and its attitude toward nature will prevent social and ecological catastrophe'.[21] I would suggest that Kerans' apparent rejection of the UN's assumptions that modernity will continue in the face of climate change, his criticism of the UN project to 'map' the harbours and lagoons of the unnamed city, and his consequent assertion that he and his companions must look inwards in order to understand that which has been 'submerged', all imply this kind of shift in self-understanding.

Indeed, Kerans' apparent rejection of his role of 'mapping the harbours and lagoons of the external landscape'[22] can be understood in terms of a resistance within the character to the anthropocentric enframing of nature. This is a process that he identifies with an emerging awareness of his own ecological consciousness – the 'submerged neuronic continents' – which he describes as being in opposition to the scientific 'mapping' of the expedition itself. This resistance is itself an example of what Andrzej Gasiorek has identified as *The Drowned World*'s 'scepticism as to the validity of the scientific outlook, which the novel […] presents as the cornerstone of a superseded modernity'.[23] Such scepticism is evident in the novel's depiction of a future in which the modernity that the UN seeks to preserve through the expedition has in fact been superseded by the advent of the new climate era. In this new era, industrial modernity is being vividly displaced by nature, as in this description of a building in the lagoon:

> The building had been gutted […] Wherever sunlight filtered through, the bare lathes were intertwined with creeper and wire-moss, and the original fabric of the building seemed solely supported by the profusion of vegetation ramifying through every room and corridor.[24]

In this passage, the image of sunlight filtering through the roof of the building is reminiscent of the canopy of a jungle. The creeper and wire moss that entwine the 'bare lathes' suggests that the cabling and wires that would once have formed part of the building's fabric have been replaced by biological equivalents. It is as if the building itself is being transformed from an anthropogenic structure into a part of biological nature, an effect underlined by the suggestion that it is only being held up by the 'profusion of vegetation'. This imagery of organic and natural formations – flora, fauna, and fluvial topography – overrunning the remnants of the anthropogenic structures of the city underlines how the anthropocentric enframing of nature as a resource has been superseded. Like the Jungle of Brian Aldiss' *Hothouse* (1961),[25] published the year before *The Drowned World*, the Earth in Ballard's novel is depicted in terms of a different era in geologic climate history, one in which humans have become only a small and increasingly obsolete part of

an overwhelming profusion of other life. In this era, the human history of modernity – which the UN seeks to eternally preserve – suddenly appears finite. In this way, the particular apocalyptic setting of the lagoon heralds a *de facto* collapse of the technological era to which Heidegger calls attention.

This apocalyptic sense of modernity being overrun by the forces of the biosphere can be traced to a distinctly Ballardian concern for the tenuous nature of human civilisation. This concern is repeated throughout his early science fiction, including in *The Wind From Nowhere* (1961), *The Drought* (1964) and *The Crystal World* (1966) which together with *The Drowned World* form Ballard's so-called 'disaster quartet'.[26] Rob Latham notes that these 'subversive disaster stories' were characterized by 'stark irrationalism and pointed mockery of technoscientific ambitions'[27] that would seem to signal a de-privileging of post-enlightenment history and, I would also suggest, the cultures of the technological enframing of nature as a resource that underpins this history. Indeed, Matthew Gandy notes that 'for Ballard, environmental catastrophe affords an opportunity to explore the fragility of modernity'[28] and highlights how Ballard's environmental apocalypse confronts modernity's reliance upon technology as a means of maintaining a misleading stability.

Latham also suggests that Ballard's motifs of planetary disaster helped to foster 'an overtly anti-hegemonic strain of eco-disaster stories during the 1960s and early 1970s',[29] which suggests an important link between depictions of environmental crisis in British science fiction's 'New Wave', and critical positions towards existing political and economic power structures. Both these power structures and the 'technoscientific ambitions' through which they establish and sustain industrial production would later become implicated as causes of anthropogenic climate change itself. As Latham further notes, the New Wave's 'anti-technocratic bent […] openly questioning if not the core values of scientific enquiry, then the larger social processes to which they had been conjoined in the service of state and corporate power'.[30] *The Drowned World* can be understood then as part of a particular science fictional tradition of mobilizing environmental apocalypse as a means of challenging the processes whereby power is served by technocratic science. But this critique is also a challenge to the kind of anthropocentric view described earlier: it is 'the rational engineering of all things as potential consumable resource' that is challenged by depictions of how those 'resources' overrun the 'rational engineering' of the state and corporate power structures that seek to exploit them.

In *The Drowned World* these power structures are represented by the UN, whose attempt to re-assert rational engineering in order to fulfil the 'tacit assumptions'[31] of an eternal human history of modernity is relayed in the text through the scientific expedition of which Kerans is a part. But the power-use that lies beneath this rational engineering of nature is brought into vivid focus around the character of the mysterious and piratical Strangman, who arrives in the lagoon

intending to pump out the floodwaters and claim salvage from the drowned city. This action appears as an attempt to reassert the history of human modernity onto the geologic reality of the 'drowned world' by treating the lagoon as a site for the exploitation of resources. In one particularly telling passage, Colonel Riggs defends Strangman's exploitation of the lagoon by stating that

> "Reclaiming land, particularly an urban area like this in the centre of a former capital city, is a Class A1 priority. If Strangman is serious about pumping out the next two lagoons he'll not only get a free pardon, but a governor-generalship to boot"[32]

Riggs' language here is of state-sanctioned exploitation. Riggs identifies the reclamation of land as an almost military objective with the phrase 'Class A1 priority', and implies special legal considerations as a reward for Strangman. By draining the lagoon in order to exploit its resources, Strangman's activities appear classically industrial and locate both himself and Riggs within the 'military-industrial-environmental complex' that Andrew Ross has described as emerging in the post-Cold War setting.[33] The critical irony here is that these 'resources' are actually the remains of the un-named 'former capital city'. In contrast to resources such as oil and coal, which were the product of ancient biological life, or metal ores laid down by ancient geological processes, these 'resources' were themselves laid down by industrial modernity. Strangman is effectively exploring downwards through the current top layer of jungle and water to reach an *anthropogenic* strata of materially exploitable deposits in the drowned city. This geophysical representation of the city as a geological strata underlines how the modernity of the city is a past epoch, one which the new 'drowned world' has replaced. Indeed, the geological subtext established by delving into the Earth's physical past to reach this strata anticipates recent debates surrounding the Anthropocene. By casting the remains of the city as a geologic layer, Ballard's text effectively frames human industrial activity as constituting a distinct geologic epoch that is defined by anthropogenic actions. This framing has the effect of locating human history within the much larger geological history of the biosphere, whilst also foregrounding how Strangman's project to drain the lagoon is a repetition of the very same practices of anthropocentric exploitation that created this geologic stratum.

By framing the human history represented by the city within the geologic history depicted in the lagoon, the novel imaginatively enacts something similar to the rethinking of the human relationship with the biosphere that Chakrabarty associates with climate science; namely to 'unwittingly destroy […] the artificial but time-honored [*sic*] distinction between natural and human histories'.[34] In this way, the speculative apocalyptic future of *The Drowned World* begins to

disrupt the anthropocentric distinction between the history of the human subject and the history of the biosphere, and encourages the reader to see 'ourselves as a part of our habitat'[35] once more. But this disruption also undermines the UN's attempts to preserve any form of power over the lagoon; the representation of modernity as a past geologic epoch signals how that power has become obsolete.

Indeed, whilst the continued existence of the underlying logic of that power is depicted at work in Strangman's project – which seeks to exploit the resources of the biosphere and is tacitly sanctioned by the UN through Colonel Riggs – we know that Strangman's projects are doomed to failure. The novel details how previous attempts to defy the rising waters and defend Europe's 'reluctant Venices'[36] all proved to be unsustainable. Against the rising waters of geologic history that have reshaped the planet, Strangman's localised and temporary reclamation of a few streets of London seems absurd. Despite being marked with the anthropogenic remnants of modernity, the geologic history of *The Drowned World* has clearly moved beyond this era of what we might now describe as the Anthropocene. Indeed, Strangman's project ironically depicts its own futility in specifically drawing attention to the 'strata' of a *past* geologic epoch during which such power was possible.

We can therefore understand the resurgence of nature in *The Drowned World* in a more profound way than a simple depiction of modernity's fragility. More specifically, this resurgence of nature signals a disruption of modernity's historically assumed dominion over nature. This disruption is foregrounded by the 'drowning' of the world of that modernity, which both displaces the physical modernity of the city and which resists attempts to reassert the enframing of nature either through the cartographic and taxonomic practices of science, or through the direct exploitation of Strangman. The 'world' that is 'drowned' is the world of modernity within which Heidegger's account of the anthropocentric enframing of nature occurs. This environmental 'drowning' is both literal in the sense of a rising tide of water that humanity is powerless to stop, and more figurative in the sense that the new forms of plant and animal life that attend the rising water levels are also 'drowning' the anthropocentric foundations of the modernity that the UN seeks to preserve. *The Drowned World*'s narrative account of this 'drowning' begins to foreground humanity's condition as a part of the biosphere's geologic history by attesting to that history's role in shaping humanity's future. But the stratification of this drowned world also gestures towards humanity's interdependence on the geophysical past; it was only during the conditions of this past that the enframing of nature by humans was possible. Thus we can understand Kerans' sense of the futility of the UN's attempts to maintain the 'same social and domestic relationships …[and]… the same ambitions and satisfactions'[37] as signalling his growing awareness of the futility of resisting the 'drowning' of modernity within the broader sweep of geologic history.

***'Aqua incognita'* - Submerged Continents and Ecological Consciousness**

If the 'drowning' of the 'world' of modernity can be understood as signalling an environmental trigger for Kerans' growing awareness of the futility of mapping the 'harbours and lagoons of the external landscape', then it is this 'drowning' that also signals his emerging consciousness of the 'submerged neuronic continents' of Bodkin's 'archaeopsychic time'. The text underscores this link between the 'drowning' of the world and the emergence of this consciousness through imaginative allusions to amniotic water as a way of depicting Kerans' changing understanding of his own relationship with the biosphere. The key example of this allusion is in the 'uterine' imagery of the passages that depict a diving expedition by Kerans into the lagoon.[38] Kerans descends into a submerged planetarium and encounters the 'huge vacant womb' of the auditorium containing a 'cradle of silt […] like an immense placenta'.[39] In this startling image of returning to the womb, he observes an 'unfamiliar zodiac' caused by cracks in the planetarium roof that also hint at a different era in geologic time that Kerans suggest might be that of the Triassic. The history of both the individual organism and the species are unified in this imagery of a womb that maps a past epoch of the universe. This effect is underlined by his feeling of the 'pressure of the water penetrating his suit so that the barriers between his own private bloodstream and that of the giant amnion seemed no longer to exist'.[40] This uterine imagery invokes a sense that Kerans is returning to some form of pre-natal condition that is also suggestive of the ancient primordial ocean. His physical biology, here relayed through his blood, is merging with the liquid rendering of geologic history that the planetarium suggests, so that his biological existence is situated as part of the biosphere. When he is finally overcome by a lack of oxygen, he enters an even more existential state in which 'Epochs drifted' and 'Giant waves, infinitely slow and enveloping, broke and fell across the sunless beaches of the time-sea, washing him helplessly in its shallows'.[41] This is a powerful image of humans as a species located within a geologic history to which they are subject. The 'time-sea' invokes the origins of life in the primordial oceans, the origins of individual human life in the womb, and the Judeo-Christian tradition of the world beginning in a 'formless' state covered in a 'raging ocean'.[42] Kerans is 'helpless' before this sea, which washes him in its 'shallows' and so frames him as a biological agent whose perspectives of the world are small compared to the larger reality of the time-sea itself. This experience therefore seems to anticipate the same sense of being part of a 'deep' species history that Chakrabarty describes; in the merging of his own biology and geologic history in this experience, Kerans is given back his 'direct relation with ecology'.[43] He becomes conscious of his biological agency and newly aware of his dependence upon the vast and complex system of

the biosphere. In this way, the split between the human subject (Kerans) and the biosphere as an object of exploitation (by the UN and Strangman) is imaginatively challenged.

We might even suggest that it is upon these 'sunless beaches' that Kerans first perceives something of the 'submerged neuronic continents' he has been seeking. These 'neuronic continents' are, we must recall, associated by Kerans with the revelation in the new climate era of something that has been submerged. This revelation occurs alongside an imaginative transformation of Kerans and other characters through a psychological regression which the character of Dr Bodkin links to the geophysical regression of the biosphere to an earlier epoch. This psychological regression is described by Bodkin as the 'Psychology of Total Equivalents': 'I am convinced that as we move back through geophysical time so we re-enter the amniotic corridor and move back through spinal and archaeopsychic time, recollecting in our unconscious minds the landscapes of each epoch.'[44] In this passage, Bodkin also invokes the uterine imagery of the 'amnion' in his description of how the procession of geologic epochs is linked to the evolution of the human mind. He describes the regression of the biosphere as coeval with a regression of the human psyche that he also frames as reminiscent of a return to a pre-natal state. As Umberto Rossi has argued in his reading of this section of the novel: 'The so-called "Total Equivalents" are "symbolic stations" stored in the spinal cord. Such stations can be reached again by consciousness thanks to climatic change.'[45] These 'stations' relate to Bodkin's description of the points in the brain and spinal cord where advanced neural structures give way to more primitive ones that evolved during correspondingly earlier epochs of geologic history. Rossi's reading of these stations highlights how the reversion of the biosphere to these earlier epochs via climate change is linked by the text to a movement away from the scientific knowledge and advanced cultural and political formations of modernity associated with the advanced neural structures of *homo sapiens sapiens*. This movement enables the novel's human characters to access the previously submerged 'symbolic stations', which Bodkin associates both with a pre-natal condition before modernity, and with the geologic history of the planet.

What is at stake in the 'Psychology of Total Equivalents' is nothing less than the complex interdependencies between the human species and the geologic history of the planet, which directly challenge the anthropocentric separation of the human subject and the biosphere as object. Beyond the typically Ballardian concern for human psychology and the potential return to barbarism that lies beneath the surface of human society, this concept imaginatively calls attention to complex and deeply rooted connections between humanity's physical and psychological evolution, the biology of the individual, and the biosphere as a whole. Bodkin's concept links the individual's experience of the apocalyptic drowned world to their condition as part of the human species, and asserts a further interdependency between this sense of species and the changes occurring to the biosphere. In doing so, the fictional 'Psychology of Total

Equivalents' also anticipates Chakrabarty's account of the 'deep' species history of biological agents. By imagining humans in evolutionary terms, their condition as a species, and that species' history across geologic timescales, is foregrounded. But in the novel this emerging consciousness of species history does not imply a universal human subject; Kerans' uterine experiences of 'deep' species history in the planetarium depicts humans as extensions of the biosphere itself. Through the use of this water imagery and the fictional 'Psychology of Total Equivalents', the novel encourages the reader to imagine human biology and psychology as existing in equal terms with the jungle and lagoons. The changing biosphere is changing humans; as it 'regresses' in geologic time so too do they 'regress' in evolutionary time. It is this regression – or rather this reawakening of a deep geologic past – that seems to hold the promise of perceiving the 'submerged continents' that Kerans seeks to understand.

In seeking this understanding however an important choice presents itself. As Roger Luckhurst notes, the crisis faced by Kerans and other characters in the novel is 'whether to continue the military project of mapping the lagoon before returning to Camp Byrd in the north, or whether to accept the "new logic" and head south'.[46] The option to move south relates to the novel's description of a stratified biosphere, with storms occupying the equatorial regions, the Triassic jungle covering what had been the temperate zones, and what might be termed the anthropogenic zone covering the previously inhospitable poles. Consequently, a journey southwards from the North Pole is also a journey through this hierarchy, a literal 'descent of man' from the remaining high point of modernity at Camp Byrd toward the ancient primeval past.

This choice between north and south foregrounds the text's distinction between the anthropocentric logic of the modernity that the UN seeks to preserve at Camp Byrd, and the 'new logic' associated with the equatorial regions. The lagoon itself sits between these two kinds of 'logic' and is described by Dr Bodkin as a 'zone of transit',[47] or a place in which Kerans and others in his group prepare 'for a new environment, with its own internal landscape and logic, where old categories of thought would merely be an encumbrance'.[48] This description underlines the shift in self-understanding promised by journeying south, and associates this journey with the move through the 'zone of transit' of the nervous system also described by Dr Bodkin in his Psychology of Total Equivalents.[49] This dual imagining of a zone of transit as both geophysical and neurological encodes the journey 'south' as a jointly physical and psychological journey in which the 'old categories of thought' – the anthropocentric ways of thinking associated with the modernity of the UN – are an obsolete encumbrance to be cast aside. Indeed, in eventually passing through this zone of transit and heading south, Rossi notes that: 'Kerans says goodbye to his role of historical and cultural subject. At the end of *The Drowned World* the reader can only witness the ultimate divorce between humans and city, between human being as biological entity and civilisation.'[50] This 'divorce' between human beings as a biological entity and their 'historical

and cultural' subjectification as part of the modernity of the city illuminates the importance of Kerans' exit from the lagoon at the start of his southward journey. Kerans' decision to move south constitutes a fundamental rejection of this subjectification that involves both removing himself from the physical environment of modernity and a repudiation of the internalised psychological reproduction of this modernity. He begins instead to embrace the ecological consciousness of the biologic agent, or in his own words the 'neuronic continents' that were previously 'submerged' by his life with the UN mission. As we saw in Kerans' experience in the water of the drowned planetarium, these 'submerged neuronic continents' represent his own sense of what we might describe after Chakrabarty as a consciousness of humanity's 'deep' or geologic species history. The ecological consciousness of this geologic history of the human biological agent has been 'submerged' by the psychological reproduction of the enframing of nature as a resource that the novel associates with the modernity of Camp Byrd in the 'north'. It is the re-emergence of this submerged consciousness that promises to be embodied by the dually physical and psychological journey south.

'Paradises of the Sun' and Camp Byrd: Kerans' Elective Banishment to 'Bare Life'

The embodiment of this 're-emergence' by the journey south is relayed through the novel's framing of this journey as an abandonment of the 'role of historical and cultural subject'[51] that Kerans assumes in the lagoon. Kerans' life in the lagoon, and by extension his life as a citizen of Camp Byrd, can be thought of in terms of what Giorgio Agamben has described as the 'politically qualified life',[52] in which his existence was determined by and subject to the legal and political forces of that society. Added to these were the cultural forces that accompanied his membership of that society, such as his status as a scientist and the social norms that governed his interpersonal relationships with the novel's other characters. As part of this society he was also encouraged to imagine himself within the human history of industrial modernity that Camp Byrd seeks to maintain.

When Kerans finally resolves to leave the lagoon and journey south, the narrative provides an important insight into his feelings about his former life:

> His time there had outlived itself, and the air-sealed suite with its constant temperature and humidity, its supplies of fuel and food, were nothing more than an encapsulated form of his previous environment, to which he had clung like a reluctant embryo to its yoke sac.[53]

In this passage we again find a form of uterine imagery that suggests Kerans' departure from the lagoon is a form of re-birth. The 'yoke sac' is the hotel in the lagoon in which Kerans has been living; a self-contained 'encapsulated form' of the politically qualified life of Camp Byrd that also suggests a separation from the realities of the biosphere. But this 'encapsulation' contrasts with the vast scales invoked by Kerans experience of the 'time-sea' and suggests an egg-like demarcation quite different to the 'giant amnion' of his experience of the planetarium. This imagery of the egg, which is emphasised in the next sentence with the line 'The shattering of this shell',[54] is important because it underlines the temporary condition of the modernity that has been preserved at the hotel. An egg has finite resources and is only part of the life cycle of the organism that lives within it. Outside the egg is the biosphere, which in the drowned world is no longer compatible with the modernity preserved in the 'egg' of the hotel, or by extension at Camp Byrd. But the word 'yoke' also carries the double meaning of oppression and confinement, and so registers not only the sustaining material resources of modernity, but also the oppressive separation from nature that this modernity demands. This double meaning suggests that we understand Kerans' politically qualified life in the lagoon as a form of restriction that prevents him from embodying the ecological consciousness of his biological life that is promised by the 'sunless beaches of the time-sea'; it is only by shedding the yoke of his former life that he can ultimately escape this anthropocentric separation from the biosphere.

This sense of shedding both modernity and his politically qualified life is further relayed in a later scene during his southward journey, in which he crosses an inland sea in a small boat during a storm: 'as the rain-storms lashed down, he felt well enough to stand up on one leg by the mast, letting the torrential bursts rain across his chest and strip away the ragged fabric of his jacket'.[55] In this scene Kerans' jacket, which represents his life as part of the expedition and as a subject of Camp Byrd, is literally stripped away by the changed climate, which here is represented by the storm. This is an evocative image of the stripping away of civilisation by the climatic effects of the new geologic era that emphasises how that civilisation has been contingent upon an environmental condition that has passed. More specifically, the image of Kerans returning to a kind of pre-lapsarian nakedness suggests a return to the Garden of Eden that is also foregrounded by the final line of the novel, which likens Kerans to a 'second Adam' as he heads ever southward in search of 'the forgotten paradises of the reborn son'.[56] These biblical allusions reminds us that the first Adam was naked until he ate the fruit of the tree of knowledge and realised his own nakedness. It was the acquisition of knowledge, and the consequent desire to be clothed, that heralded the expulsion from paradise. Knowledge and clothing are therefore coded in the biblical narrative as aspects of civilisation: traits that separate humans from the rest of the animal kingdom.[57] The novel registers these biblical references to nakedness by rendering Kerans as a second Adam, and so suggests that his 'nakedness' is a kind of return to an Edenic jungle; a

'forgotten' paradise[58] in which he directly experiences the conditions of nature, without the 'old categories of thought'[59] of modernity. It is only through the stripping away of the obscuring outward layers of anthropocentric modernity, like the 'ragged fabric' of Kerans' jacket, that the biological memory of humans as part of the biosphere and its geologic history are revealed. By the end of the novel, Kerans has cast off the anthropocentric view of nature reproduced by Camp Byrd, and his naked condition embodies his new ecological consciousness of the human species as inseparable from the geologic history of the biosphere. In this way Kerans fulfils Dr Bodkin's prediction that 'in so far as we are part of the planet, a piece of the main, we too are returning',[60] which anticipates this condition of humans as a species entwined in the geologic history common to all other constituents of the biosphere.

In *choosing* to journey south, however, Kerans also draws attention to how his decision to fulfil this 'return' is an act of resistance to the 'yoke' of Camp Byrd and politically qualified life that it represents. To understand this act of resistance, it is useful to think about his journey south as a movement towards what Agamben describes as 'bare life', living in a condition delineated from the legal formations of 'politically qualified life'.[61] As Leland de la Durantaye describes in his discussion of Agamben's work, the use of the term 'bare' by Agamben emphasises the removal of these layers of life: of a 'stripping away of predicates and attributes'.[62] Without these layers, what remains of the human individual who formerly constituted a 'politically qualified life' is now indistinct from the condition of being a purely biological entity. Although neither Agamben nor Durantaye were thinking about the position of humanity as a species within the biosphere – indeed, Agamben's account of 'bare life' takes no account of this relationship – I would suggest that a rethinking of Agamben's account of 'bare life' in the context of the Anthropocene can provide a productive way of thinking about how *The Drowned World* depicts Kerans' journey as a rejection of the political life of Camp Byrd and the implications of this rejection.[63]

Agamben's account of 'bare life' normally imagines the 'banishment' to 'bare life' to be an act of political violence performed by the sovereign, in which the individual is 'stripped' of the 'politically qualified life' so that they may be treated outside of its protection. Such individuals are therefore placed in the condition of 'bare life' as a form of punishment. However, in the apocalyptic future of *The Drowned World* the state's power is critically challenged by climate change, and it is in this regard that the significance of Kerans' southward journey as an act of resistance becomes clearer. As Ewa Plonowska Ziarek suggests, 'bare life cannot be always be considered as the exclusive referent of the sovereign decision'[64] but also includes a revolutionary mode that she identifies in the political use of hunger strikes. This complication of the continuous and one-way form of political violence assumed by Agamben suggests that elective banishment undermines state power. By wilfully enacting a 'stripping away' of the material vestments of civilisation, Kerans' journey is imaginatively framed as a form of *elective* 'bare life'. Kerans

embraces the 'returning' that Dr Bodkin describes in his theory of 'total equivalents' by banishing himself from the politically qualified life that the UN seeks to maintain. This self-banishment is a radical rejection of the political life of Camp Byrd that confronts both the UN's attempts to maintain an exploitative power over nature, and its tacit assumption of an eternal human history that can be preserved in isolation from the climate changes of the new era. Kerans' self-banishment can therefore be understood as a form of resistance that foregrounds the obsolescence of the UN's power in the context of the drowned world's new era of geologic history. It is this transformed environment that makes his radical shift in self-understanding possible through the changes wrought by the 'Psychology of Total Equivalents'. His elective banishment from the anthropocentric state of the UN at Camp Byrd consummates his 'charting' of the 'submerged neuronic continents' of his biological agency. The new ecological consciousness of his relationship with the biosphere that results from the novel's climate apocalypse is nothing less than his re-born consciousness of himself as a biologic agent within geologic history; his experiencing of a direct relation with the biosphere.

Drowning the World: Disrupting Ideology in the Anthropocene

We can see then that in depicting a transformed environment that constitutes a new 'era' in geologic history, Ballard's text depicts a disruption of anthropocentric modernity – its state institutions, power, and its reproduction within the psychology of individuals – that invites both Kerans and the reader to re-examine their relationship with the biosphere and to imagine the end of anthropocentric culture. It is this disruption and consequent re-examination that is performed by the radically elective self-banishment of Kerans. In this way, the novel anticipates some of the particular concerns that attend the Anthropocene, in particular what Chakrabarty identifies as the need to think about the human species' interdependence upon the biosphere in order to respond to anthropogenic climate change. But the novel also thinks beyond this concern to suggest some of the ways in which Kerans' ecological consciousness has been hitherto submerged by the 'old categories of thought'[65] that he elects to abandon.

Indeed, the traumatic transformations necessary for this consciousness to be awakened gestures towards the extent to which this condition was previously obscured by the anthropocentric enframing of nature represented by the mission in the lagoon and by Strangman. This gesturing is significant when considering *The Drowned World*'s contribution to a contemporary understanding of anthropogenic climate change, because it emphasises how an understanding of the human species' interdependence upon the biosphere serves to disrupt those same anthropocentric tendencies that are now recognised as contributing to that crisis. By imagining the apocalyptic co-transformation of both the physical environment and the human

mind, the novel effectively speculates upon the ways in which modernity itself might be understood as a form of self-propagating logic that dangerously misleads understandings of the human relationship with the biosphere. This logic is shown to maintain its own existence through the 'submerging' of the individual's condition of biological agency within geologic history. The power of this self-propagating logic was apparent in my analysis of the anthropocentric assumptions and habits of thought that surrounded Strangman's attempts to exploit the lagoon; as was evident in Colonel Riggs' approving account of them, Strangman's own actions were themselves repetitions of the logic of maintaining modernity that is represented by the UN at Camp Byrd. It is the transformation of the environment – and of Kerans – and the resulting encounter with geologic history that disrupts these repetitions and dispels the enframing of nature as an exploitable resource that these repetitions maintained.

This sense of how the enframing of nature works through a repetition of anthropocentric practices and habits of thought within the individual's consciousness suggests that the anthropocentrism described by Heidegger might serve an ideological function. For Louis Althusser, ideology denotes the means by which individuals are persuaded that their position within a dominant system of political and economic practice is natural, through a process of reproducing those practices within their own consciousness such that the 'real' conditions of their existence are obscured.[66] Althusser's understanding of ideology is apposite to an understanding of climate change because the same dominant political structure and economic base of advanced technoscientific societies maintained by ideology also produce the conditions of environmental crises that include climate change. Indeed, the anthropogenic activities of production and consumption that are central to an understanding of the economic base in Althusser's conception of ideology are intimately linked to the exploitation of the biosphere and the generation of pollution that produces climate change. Moreover, the kind of deep relationship between humanity and the biosphere implicit in the concept of the Anthropocene – and which Kerans experiences through his revelatory transformation in *The Drowned World* – constitutes a 'real' condition of existence that I would contend is obscured by ideology. Indeed, just as the 'impossible encounter with the [Lacanian] real'[67] is a traumatic experience in which the limit of symbolism is recognised, Kerans' final journey south takes him beyond the symbolic order represented by his politically qualified life in the hotel.

In making this link between Althusser's concept of ideology and the means by which an anthropocentric view of the biosphere is naturalised, I am also necessarily re-thinking Althusser's concept of ideology. Althusser's account of ideology does not make reference to anthropocentrism, nor to the relationship between human societies and the environment more generally. Indeed, Althusser's primary concerns are with ideology as the means by which an economic system reproduces itself in the psyche of the individual, or as David Hawkes

summarises, the 'imaginary way in which people experience their real lives' that causes them to perceive as real an 'ideal' that maintains 'the power of the capitalist class'.[68] This concept helps to explain how and why the majority of people do not question their relationship with the economic structure they inhabit and instead assume it to be natural and right. It also therefore begins to touch upon the very activities of human societies that most directly impact the environment: the means of production and consumption that mark out industrial modernity. In light of this, the anthropocentric practices and ways of thinking about the biosphere that are associated by the text with Strangman and Camp Byrd begin to appear as examples of these 'imaginary ways'.

Althusser's account of ideology, which he details in the essay 'Ideology and Ideological State Apparatuses', was written as a development of Marx's ideas about how the economic structure of capitalism is maintained. His ideas are therefore part of a larger context of post-Marxist thought that arguably takes the economic structure as its largest point of reference. To that extent, Althusser is part of the same tendency to treat human history as separate from species or geologic history that Chakrabarty identifies. What Althusser does not consider, indeed, what is not part of the intellectual context in which he was writing, is the position of that economic structure within the larger system of the biosphere in which it is contained and upon which it relies. Yet despite this shortcoming of the intellectual context in which the theory was developed, it now seems pertinent to reframe Althusser's conception of ideology by asking the question: how might individuals living under a technoscientific industrial modernity reproduce the anthropocentric logic of that modernity and so internalise those ideas about nature as a discrete and infinitely exploitable resource that enable them to repress the real conditions of their relationship with the biosphere?

In considering this question, it is useful to reflect upon Althusser's account of the role of Ideological State Apparatus (ISAs) in encouraging individuals to internalise the values of ideology as common sense. Althusser describes ISAs as a 'number of realities which present themselves to the immediate observer in the form of distinct and specialised institutions'.[69] It is my contention that in order for these institutions to successfully encourage individuals to internalise the ideas necessary for them to assume their proscribed role in the dominant economic system, those institutions must frame the individual's relationship with the environment in a particular way. For example, the media must naturalise the repeated cycles of the replacement of consumer goods in order to encourage individuals to participate in a continued process of production and consumption. In order to do this however, this same media must also naturalise the apparently unlimited availability and disposability of these products, which requires that individuals repress the connection between this cycle of activity and the diminishment of resources and increased carbon output of accelerating production that results, coupled with the increased pollution of land and water that accompanies disposal of the rapidly obsolescent products. In this way, the

objectification of the biosphere as an infinitely disposable natural resource, and as a site for the equally limitless absorption of waste, is necessarily naturalised under consumerism's industrial modernity. So too is the privileging sense of the human subject's right to treat the biosphere in this way, which in turn tends to disconnect humans from a sense of being part of that biosphere.

This account of how an ideological process naturalises the exploitative tendencies of anthropocentrism illuminates the significance of the repetition of enframing nature as infinite resource for human exploitation that I identified in the actions and implicit assumptions of the UN and Strangman in *The Drowned World*. This account also underlines the radical nature of Kerans' disruption of this repetition through his elective banishment. But it is also clear that such a re-thinking of ideology points towards a view of anthropocentrism as a key component in the internal logic of the conditions of modernity that are also implicated in anthropogenic climate change. Indeed, anthropocentrism might even appear as a foundation of ideology itself, because in order to bring the individual into being as a subject of ideology, that individual must be encouraged to reproduce the enframing of nature as a resource and the artificial separation of the human subject from the biosphere that this enframing heralds. In particular, it is necessary that the consumer is discouraged from thinking about the finitude of the biosphere to supply and absorb consumer culture, and their own complex interdependence upon that biosphere, as to do so would threaten the practices of consumption in which they participate. Allan Stoekl offers this link between ideology and what I would describe as its anthropocentric foundations when he notes that the 'hiding' of the 'external costs' of economic activity functions 'like ideology' to 'make possible material practices (fossil fuel culture) that generate belief in what is untrue', which includes the 'lie' of 'ever increasing production of food and things'.[70] If Ideology serves to maintain economic and political conditions that require an anthropocentric assumption of unending resource exploitation and continued growth, then it would seem that the individual geologic agent must also participate in the reproduction of this 'lie'.

Where the apocalypse of *The Drowned World* disrupted the anthropocentric practices of enframing nature and artificially distinguishing human history from geologic history, the absence of an anthropogenic cause reminds us that it did not directly encounter the further implications of modernity's ideological enframing of the biosphere as unendingly exploitable and disposable. In Chakrabarty's terms, it did not encounter the specific geologic *agency* that is maintained by the obfuscation of geologic history and which enacts anthropogenic climate change. Such an encounter does however take place through Ballard's mobilisation of the apocalyptically – and anthropogenically – transformed environment in his later novel *Hello America*. Through the use of the science fictional literary technique of 'future history', this text plots a future course for both the economic and environmental consequences of the capitalist system that relies upon individuals reproducing the anthropocentric modernity that obscures their relationship with the

biosphere as producers and consumers, and the ecological implications of this. As I will now demonstrate, the novel's speculative depiction of the collapse of the economic and political system of the United States discloses the ways in which the anthropocentrism that underpins the ideology of modern consumer societies obscures the interdependence of humans upon the biosphere.

Hello America: The Anthropocene and American Dreams

Ballard's *Hello America* imagines a hypothetical future in which an apocalyptically transformed global environment is presented as the consequence of a specifically American form of consumer-driven industrial modernity. Weakened after the collapse of its own over-production, America has been unable to resist a USSR-led geoengineering project to dam the Bering Straits. This project has transformed the Earth's climate patterns and made the North American continent practically uninhabitable. The United States has been abandoned in the face of rapid desertification and has ceased to exist as a political entity. Although other areas of the world continue to sustain a 'low-level industrial life',[71] the United States itself has suffered a form of national apocalypse in which environmental transformation has destroyed its social and political structures, leaving only the physical remnants of its former industrial modernity.

The fall of this modernity is principally elucidated in the text through a short early chapter called 'The Crisis Years' that mobilises the science fictional technique of writing a future history. As Andy Sawyer notes, this technique has been used for a range of literary purposes in science fiction, from a means of fulfilling reader demands in multi-novel sequences such as the *Dune* series,[72] to providing a temporal structure which interrogates the historicising processes of literature itself, as in Margaret Atwood's *The Handmaid's Tale* (1985).[73] In the case of *Hello America,* the presentation of this history from the point of view of a narrating voice located in the early twenty-second century specifically imagines how the human history of American modernity might unfold in a way that is ultimately apocalyptic. In so doing, the novel's apocalyptic future foregrounds the interdependency between this history and the geologic history that it has altered.

In this speculative history, the exhaustion of fossil fuels leads to several years of global energy crisis. America is forced to outlaw private gasoline powered cars. but the effect of this prohibition is not just material; it also disrupts a dominant idea of American capitalist modernity that the novel frames as critical to an American sense of nationhood:

> […] as the traffic drew finally to a halt […] the whole nation seemed to lose its vitality, its belief in itself and its future. The sight of millions of

> abandoned vehicles seemed a last judgment on the failure of a people's will. [74]

This passage is related by the novel's omniscient narrator as a summary of a discussion between several characters who are trying to 'make sense of the vast climatic upheaval that had denuded this once powerful and fertile land'.[75] The critical factor in the specifically American experience of this future history is identified as the traffic drawing to a halt, which the passage suggests signals a failure of the American 'belief in itself' and of their 'will'. In this way, the passage highlights a critical association within the novel between fossil fuels, the car, and something essential in the idea of American modernity that hints at a close association between American history and the geologic history from which fossil fuels arose. It is America's history of 'vitality' and 'belief in itself', embodied here by the car, that is shown to be tied to the availability of fossil fuels that are themselves part of geologic history. The implication is that without this geologic historical condition of fossil fuel availability, which 'had fuelled the US economy throughout the twentieth century',[76] the very idea of America as we know it could not have existed. Yet as the passage makes clear, American industrial modernity has also directly contributed to the end of such resource availability. Although the immediate anthropogenic cause of the desertification of North America is the damming of the Bering Straits, this cause is itself contingent upon a crisis in the history of American industrial modernity, the loss of American 'vitality', that is caused by the overconsumption of oil. These environmental changes are therefore clearly presented as the outcomes of human, and especially American, histories of consumption. Moreover, the end of American history is framed by the novel as contingent upon a coeval and *anthropogenic* end of a distinct era of geologic history that is identified with the end of fossil fuels.

This re-framing of America's history of industrial modernity in terms of geologic history does not only anticipate more recent discussions of the Anthropocene; it also elucidates what Umberto Rossi has identified as the text's 'overt historicity' in presenting the causes of the 'climatically mutated land' as 'economic, ecological, political – or, in a single word, historical'.[77] In other words, this is climate change as a product of human history. Moreover, the specifically American setting of the novel portrays America as the ultimate expression of this history, insofar as it is America's technoscientific consumer culture that fulfils the conditions from which the novel's depiction of anthropogenic climate change proceed. I would suggest that this focus upon America is part of a specific literary conceit of Ballard's – a conceit which encourages readers to imagine American history as the archetype of the human history of technoscientific consumer modernity that has heralded the transformation of the environment.

Wayne and an Apocalypse 'Made in the U.S.A'

Indeed, the specificity of America in the novel's depiction of its apocalyptic future history is not merely apparent in the setting, but also in the narrative's many references to 'real' American history. These references, which I examine in more detail below, include the westward expansion, the gold rush, American corporations, famous presidents, and even an infamous American murderer. However, I have deliberately used the word 'real' in inverted commas here because of the ways that these references are invoked by the text through Wayne, the novel's main protagonist. Wayne is a descendent of Americans who fled North America over a century before. He has grown up in an austere Europe, and returns to America as a stowaway on the first expedition to the country for many years. Whilst Wayne is ostensibly searching for his lost father, he actually appears more concerned with the possibility of starting 'everything up again',[78] by which he means the reconstruction of American modernity through a repetition of American history. Yet his vision for this reconstruction is based upon archived images of America's superabundance contained in magazines, films, and the 'ancient slides in the Geographical Society in Dublin'.[79] Wayne's reliance upon archived mass-media images for his understanding of America signals how this understanding is idealised and often superficial, and constitutes an imaginary relationship with America. This imaginary relationship is crucial to how American history is related in the text by the narrative's focalisation through Wayne. It is this image-orientated simulation of American history that underpins Wayne's understanding of America, and which also obscures from him the ways in which American industrial modernity was implicated in the climate change that the novel depicts.

Significantly, the opening line of the novel relates two such idealised images of American history – gold and the New York skyline – whilst also relating these to geologic history: '"There's gold Wayne, gold dust everywhere! Wake up! The streets of America are paved with gold!"'[80] The character McNair shouts these words as the expedition's ship, the *SS Apollo*, sights the abandoned New York for the first time. The association between America and gold is historic, conjuring up images of the wealth and opportunity of the nineteenth-century gold rushes and the broader image of America as a land defined by the potential for exploitation of its natural resources.

Indeed, the 'gold dust' is implicated in Wayne's particular imaginary view of American history. He describes the 'World Trade Center, and the 200-storey OPEC Tower' on the skyline of New York as 'peaks and canyons' that he 'knew by heart, and which now seemed transformed by this dream of gold'.[81] This relation between the corporate skyline of New York as an American landscape and the dream of gold emphasises the possibilities of exploiting the natural resources of the continent, and invokes a heroic image of America as a land of opportunity. But the 'gold

dust' turns out to be no more than sand; the dunes of the vast desert that consumed most of North America as a result of the climatic changes brought about by human activity. This contrast between McNair's jocular reference to gold dust and the reality of sand not only highlights a symbolic misreading of nature as a resource, but also the geologic transformation of America that is part of both its natural history and the human history of its inhabitants. In this way, the 'gold dust' also signals to the reader that there is a harsher reality beneath the image of New York that greets Wayne; namely the climatic reality of the desert. Wayne's view of America as a land of exploitable riches is therefore immediately contrasted with an ecological reality with which it seems incompatible.

The novel expands on this contrast further in the opening chapter through Wayne's exploration of the abandoned New York. Wayne arrives expecting an America like that of the 1980s, shortly before the beginning of the 'crisis years'. Instead, he finds that the 'once heroic landscape of giant highways, factories and tower blocks' is punctuated with a 'second shabby world of metal shanties'.[82] This contrast between the image of a prosperous America with dominion over the landscape and an apocalyptic 'shanty' America overrun by ecological disaster is reminiscent of Margaret Bourke-White's famous 1937 photograph *At the Time of the Louisville Flood* [*Figure 5*], which depicts a queue of refugees from the 1937 flooding of the Ohio river in front of a poster proclaiming the 'World's highest standard of living'. The image of the 'American way' in the poster emphasises the importance of the car as part of that 'way' and the standard of living it promises in terms of economic purchasing power, property ownership, mobility, and technological supremacy. Yet this image contrasts with the queuing refugees who have lost most of their property, have little visible signs of economic power, and have been forced to walk for miles to reach safety.

Figure 5: Margaret Bourke-White's *At the Time of the Louisville Flood*[83]

Bourke-White's photograph raises a number of critical questions, including the racial politics of representing the 'American Way' with exclusively white Americans (even the dog is 'white'), and the contrasting repetition of social hierarchy along racial lines that is also repeated in more recent representations of environmental crises such as the aftermath of Hurricane Katrina.[84] But it is the juxtaposition of the American car as a symbol of a particular configuration of the 'American Way' with the refugees queuing on foot that is most useful in interpreting how Wayne's vision of America is disrupted by the apocalyptic New York in which he arrives. The billboard poster's painted illustration presents the car as a symbol of an 'American Way' of life framed in terms of wealth and freedom. Yet this rhetoric is undermined by the contrasting presence of the queuing refugees who share the photographic frame. This contrast between wealth and poverty is further underlined by the contrast between the *painted* illustration and the *photographic* image, which suggests that the former has an imaginary quality that is undermined by the realism of the latter.

The contrasts between an imaginary vision of America represented through idealised images of the automobile and a different reality encountered in the aftermath of an environmental crisis is recalled by Wayne's encounter with the cars of the future New York:

> His childhood in Dublin had been fed by dreams of an America filled with automobiles, immense chromium mastodons with grilles like temple façades. But the vehicles he found in the streets and suburbs of New York were small and cramped, as if they had been designed for a race of dwarfs.[85]

Wayne's dreams of American cars as vast machines built for a heroic nation are contrasted with the small practical vehicles that marked the final years of oil availability. For Wayne, these 'immense chromium mastodons', which dominated the American landscape, function as a metonym for America's history of industrial modernity. But the specific metaphorical reference to the 'mastodon', one of many species of North American megafauna that became extinct at the end of the Pleistocene, also highlights how these cars occupied a limited niche in geologic history.[86] These cars were reliant upon the conditions of a fossil-fuelled modernity that is itself contingent upon a particular condition of geologic history, and it is this condition that has passed. Wayne's 'dreams' of 'chromium mastodons' therefore frame these cars as part of an unsustainable species: large but also inefficient, consuming vast quantities of oil and converting them into pollution. Indeed, they are the very thing that marked the end of American history in the novel, when such vehicles were outlawed and became extinct. This metaphorical representation of the car as an extinct species situates it within a limited period of geologic history, and in so doing frames American history itself as part of limited moment in this history.

Such framing recalls the image of modernity as a strata of history in the lagoon of *The Drowned World*. But in contrast to Kerans, Wayne's evident disappointment with the cars he discovers in New York also indicates his unwillingness to acknowledge the relationship between these two histories under which America expanded and later collapsed. Instead, he remains in thrall of 'an America filled with automobiles'[87] and the 'vitality' and 'belief' that it promises.[88]

Both the 'gold dust' and the cars that Wayne encounters in the opening sections of the novel therefore signal a disparity between Wayne's idealised view of America's history of industrial modernity and the environmentally apocalyptic America he encounters. This disparity draws attention to how the vanished industrial history of America is situated within geologic history. But Wayne's apparent inattention to the implications of this disparity suggests that he is in some way discouraged from viewing the reality of these histories, even as he encounters the consequences of them. Indeed, Wayne's obsession with American cars in particular seems to draw attention to how a specifically American type of excess has obscured its own implication in environmental destruction and has effectively naturalised its unfettered exploitation and consumption of nature. I would suggest that this is precisely the functioning of what I described above as the anthropocentric foundation of ideology within modernity. Wayne's 'dreams of an America filled with automobiles' reproduce this anthropocentric view of nature as a resource, and this reproduction obscures the ways in which America's history of industrial modernity is situated within the geologic history of the biosphere and is implicated in its own undoing.

This reproduction is relayed by the text in various ways. Wayne's desire for the image of an America of limitless riches and unfettered consumption is reflected in the novel's narrative through the third-person subjective voice that is focalised through the eyes of Wayne for most of the text. At times, this narrative voice almost seems to revel in the imaginary possibilities of re-creating America, even as it reveals the ultimately self-destructive contradictions of this ideal. The novel's vision of the unsustainable but 'heroic landscape of giant highways, factories and tower blocks'[89] that Wayne and his companions dream of is contrasted with a desire to 'get away from a tired and candlelit Europe, with its interminable rationing and subsistence living, its total lack of any flair and opportunity'.[90] These references to candles, rationing and austerity frame Europe as a society that has regressed from the high water mark of industrial modernity that existed in America. The apparently sustainable industrial civilisation that remains there is also austere, with the words 'tired' and 'candlelit' in particular recalling a sense of the resource scarcity of post-war Britain. The lack of 'flair and opportunity' imply that this regression has been reproduced in the consciousness of the individuals who occupy it, so that the apparent sustainability of Europe's use of resources is aligned with a view of those resources that is quite distinct from the one Wayne associates with America. Wayne's desire for the consumer-driven American modernity that has demonstrably caused this regression and the apocalyptic transformation of America is therefore

reflected in the narrative's own depictions of the contrast between this 'heroic' American modernity and the 'tired' Europe.

The novel's specific and repeated identification of a contrast between America and Europe can be traced in part to what Travis Elborough identifies as Ballard's own experience of the contrast between the pre-war Shanghai of his youth, which was in Ballard's own words '90 per cent Chinese and 100 per cent Americanised', and the post-war austerity of a Britain that looked to him to be 'mean…a sad place'.[91] In this sense, the particular form of industrial modernity that America represented for Ballard appears to be glamorous and seductive in spite of its capacity for self-destruction. Yet it should also be clear that Ballard does not limit the idea of 'America' to a singular nation state at a delimited point in history. It is an *idea* of America that existed in the Shanghai of his youth, and it is a similar idea which exists in the mind of Wayne. This idea lies at the heart of Wayne's imaginary relationship with the North American continent that he has dreamed of visiting, and which he dreams of rebuilding as a new American nation. But the recognition of this dream also invites the reader to consider their own participation in these visions, irrespective of their own nationality. It is as if the novel invites us to consider that which Ballard himself claims in an introduction to the novel written in 1994, 'However hard we resist, our dreams still carry the legend "Made in USA"'.[92]

This sense of dreams being 'Made in the USA' illuminates the novel's conceit of presenting America as an archetype for the same anthropocentric industrial modernity with which this thesis is concerned. I would suggest that these 'dreams' constitute the ideological processes by which this modernity is maintained, and geological agency is obscured. When, as I now demonstrate, the novel interrogates the 'American dreams' of Wayne during his journey across America, it also encourages the reader to re-examine their own imaginary relationship with the biosphere.

America and Anthropocentrism: The American Dream as Ideology

Rossi has suggested that *Hello America* offers a 'lucid and ironic anatomy' of the 'American Myth', and that the myth itself has an 'historical genesis and a historical unfolding'.[93] It is the retelling of this history through a 'hallucinatory replica of American history'[94] that structures much of the novel as Wayne and the crew of the Apollo journey westwards across the environmentally apocalyptic setting of America. This history is alluded to in a fragmentary and often anachronistic way, for example in a scene describing the different forms of transport that they employ:

> Steiner rode his black mare at the head of the expedition, his dark figure shimmering in the haze that rose from the metalled road […] Behind him

> came the baggage train of twenty horses, loaded with supplies, camping equipment and the scientific instruments – half the laboratory from the *Apollo* packed into dozens of saddlebags. [95]

In this extract, the text evokes and combines the particular American tropes of both the historical westward migration of the baggage train and the tradition of the American road novel's open highway, whilst also obliquely referencing America's space programme. In doing so, the novel signals that this journey should not be read as a replication of an authoritative national history, but rather as a fragmented collection of images and references; the 'hallucinatory replication' that Rossi describes. Indeed, the 'hallucinatory' style of this replication works with the novel's tendency to focalise events through Wayne's own fragmentary consciousness of American history to underline an imaginary quality to this history that draws attention to its limitations. It is this imaginary quality that marks Wayne's 'dreams' of America, and hints at how they may be misleading. By analysing the disruption of these dreams during the course of Wayne's journey from east to west we can begin to trace the novel's interrogation of how they have misled Wayne, and obscured the interdependency between the human history of America and the geologic history of the planet.

For the purposes of this analysis, the 'dreams' I am discussing constitute Wayne's own particular formulation of the American Dream, which I will identify as consisting of several common and recognisable elements of different 'American Dreams' described by Jim Cullen in *American Dream: A Short History of an Idea That Shaped a Nation* (2003). Specifically, Wayne's desire for luxury cars and his delight at images of the factories that built them and the giant highways on which they ran can be broadly identified with what Cullen calls the 'Dream of the Good Life'.[96] Cullen describes three versions of this dream that appear in American society during the course of its history, beginning with 'The Puritan Enterprise'[97] in which the early settlers in New England sought to create a society based upon their own ideology. Cullen traces the evolution of this desire for the 'Good Life' through the dream of 'Upward Mobility' exemplified in Abraham Lincoln's 'rise from obscurity to the pinnacle of American life'[98] to the more contemporary dream of 'The Coast'. This is the dream of effortless 'fame and fortune'[99] promised by Hollywood. These dreams therefore also mimic a progression of American history.

Cullen's account of the Dream of the Good Life is particularly apposite to my analysis because the individual's belief in the possibility of 'upward mobility', or the inherent legitimacy of 'fame and fortune', reproduces both the economic hegemony of the United States and, critically, the exploitation of resources upon which it relies.[100] By understanding Wayne's journey in terms of an attempt to reproduce the 'Dream of the Good Life', it becomes clearer how Wayne's own particularised version of these dreams can be considered as an example of an ideology built upon

anthropocentric foundations. Understanding the novel's 'hallucinatory' replication of American history is therefore important, because it is through Wayne's imaginary relationship with America and its history that the novel reveals how his status as a geologic agent is obscured.

"Hey Pilgrim!": Wayne's Dream of Puritan Enterprise

Wayne's journey across America begins with a particularised version of what Cullen describes as the 'Puritan Enterprise', in which Wayne imagines himself as a new settler arrived from Europe who is attempting to create a new 'America' based upon his ideals – ideals moreover that he is unable to express amidst the austerity of Europe. Beginning with Wayne's exploration of New York, it is apparent that he considers America to have returned to its earlier historical condition as a frontier country, with New York itself as the place of landing and the land beyond a 'Great American Desert'[101] open to exploitation. Wayne's immediate response to the sand and the small cars of New York is to re-assert a desire for the 'opportunity' that the country beyond presents. He points to the west and declares to fellow explorer McNair that they 'can still find gold, and silver' and that 'There's the whole of America over there'.[102] Clearly this interest in gold and silver marks Wayne's 'Puritan Enterprise' as anything but 'Puritan'; his ideal of America is for a country of riches and 'flair'. But within his own imagined role in reconstructing American history he fulfils a version of Cullen's 'Puritan Enterprise' in that he has departed a 'tired and candlelit' Europe with which his ideals are incompatible, and seeks instead to create a new state founded upon those ideals in the 'new' continent upon which he has landed. His desire to explore westward to the 'whole of America' is therefore identifiable with the first iteration of Cullen's 'Dream of the Good Life'.

In articulating his fragmentary sense of this dream in his statement to McNair, Wayne's desire to expand westward from New York is suggestive of the pursuit of resources ('gold and silver'), as well as an ideological basis for legitimising this expansion (his ideal of America). In this sense, Wayne's 'Enterprise' also – rather anachronistically – incorporates an unusual and particular repetition of the American historical narrative of manifest destiny. Manifest destiny sought to reproduce European American interests in exploiting the North American continent by asserting that the European American system of government and economy was 'manifestly' right and correct. Indeed, a key underpinning of manifest destiny was not just that European American culture could exploit the natural resources of America more effectively than the Native Americans, but that this culture was privileged precisely *because* it could do so.[103] In this way, manifest destiny is implicated in the reproduction of the enframing the environment as a resource.

Although manifest destiny and the westward expansion that it legitimised are usually understood as colonial acts of territorialisation, this colonial enterprise pre-supposed a logic of viewing the landscape of the 'west' as an environmental resource to be exploited.[104] We can understand Wayne's dream of 'Enterprise' as a repetition of a version of manifest destiny because he too enframes the North American continent, or at least the former United States, as a natural resource to be exploited. As he begins the journey west, the text describes him feeling

> […] the certainty that they would find the El Dorado he had dreamed of for so long – not the literal golden city sought by McNair, but that vision of the United States enshrined in the pages of Time and Look, and which still existed somewhere […] He looked out over the thirstlands of New Jersey, certain that he could master and tame this wilderness, in some way make it bloom again.[105]

This passage elucidates Wayne's view of the landscape he is about to cross as an exploitable environment that contains the resources of his 'vision of the United States' and which he can 'master and tame' by exploiting these resources. The agricultural metaphor of making this environment 'bloom again' underlines this exploitation, and hints at the desire he expresses later in the novel to 'turn this desert green again',[106] which itself implies a form of geologic agency. Wayne's belief that the United States still exists out there 'somewhere' suggests a particular re-imagining of manifest destiny in which the conquest of the landscape is not just 'manifest' because of a notionally superior capacity to exploit its environment, but more specifically pre-destined; Wayne views his conquest as a repetition of this earlier one. Wayne's comparison of the old United States to the gold of Eldorado registers this sense of how his ideal of the United States is a resource that he has a duty to rediscover, like a precious metal lying buried in the Great American Desert to be mined and reformed into a new state.

The apocalyptically transformed environment of America is therefore re-coded by Wayne as a site of opportunity for exploitation in the creation of a new country based upon his idealised view of the old United States. This re-coding registers how Wayne's dream of re-building an America of 'flair and opportunity' – which I have suggested registers Wayne's own particular form of Cullen's 'Puritan Enterprise' – involves a repetition of a particular form of manifest destiny through which Wayne imagines the 'certainty' of this re-building. But we can also see that this act of repeating the westward expansion also involves repeating a view of the West as an 'illimitable plain'[107] that is open for conquest and environmental exploitation. In the original westward expansion, this view necessitated the obfuscation of several inconvenient realities, most notably the environmental consequences of this exploitation, which were often ruinous;[108] and the

legitimacy of the Native American groups who already lived there. This view therefore hid the reliance of that expansion upon both a geologic and human historical context that was rooted in an environment with a limited capacity to absorb those changes. Wayne's own repetition of the logic of manifest destiny in his dream of re-building America in the image of 'Time and Look' magazines also requires him to reproduce an illusion of the limitless exploitation of that landscape's environment. What Wayne's misleading dream of the 'Puritan Enterprise' encourages him to ignore is that it was this same illusion of limitless exploitation that ultimately led to the apocalyptic reality of the very same desertified America that he is crossing.

Wayne and the Las Vegas White House: The Hallucinatory Dream of Upward Mobility

The next stage in Wayne's repetition of his imagined view of American history is marked by his desire for what Cullen describes as 'upward mobility', which is the dream typified by Abraham Lincoln's 'rise from obscurity to the pinnacle of American life'.[109] This dream is hinted at throughout the text in Wayne's own journey from obscure stowaway towards his dreams of rebuilding America, but is finally embodied by the appearance of the self-styled President Manson. Manson is a Howard-Hughes-like character who has established his own vision of a new America in the 'White House' of Las Vegas.[110] Manson's presidency appears to further Wayne's dream of re-building America, because like Wayne he appears determined to 'start everything up again'.[111] Manson offers Wayne the position of Vice-President, and Wayne confides in his diary that 'he has every right to call himself the forty-fifth President […] I can't stop myself thinking who might be the forty-sixth…'.[112] This passage establishes Wayne's view that the right to be President is invested in Manson's ostensible plan to re-create American modernity. For Wayne then, the dream of upward mobility is tied to the regeneration of American modernity. However, the location of Wayne's encounter with this 'President' Manson – Las Vegas – reminds us that the America through which Wayne has been travelling is neither that of the seventeenth century Puritans nor that of Lincoln's nineteenth century. Far from being a pristine environment that appears to have endless resources, it is one marked by the late-twentieth century modernity of Las Vegas and apocalyptically transformed by the climatic changes wrought by the damming of the Bering Straits. Wayne's desire to reconstruct American industrial modernity is ironically juxtaposed with this reality of an apocalyptic environment that has been created by the same American history of modernity that Las Vegas represents and which Wayne seeks to reproduce.

This irony draws attention to the ways in which Wayne's desires to rebuild America and even become president are predicated on an imaginary relationship with the apocalyptically transformed environment. But the ways in which this imaginary relationship is maintained are underlined through a particularly striking series of scenes in the middle of the novel where Wayne

encounters vast holographic projections of images from old Hollywood Westerns. He describes these to another character as 'John Wayne, Henry Fonda, Gary Cooper, and Alan Ladd, each about a mile high'.[113] The images are simulations of actors who themselves simulated the frontier imagery of the Old-West. The appearance of these 'visions in the sky'[114] therefore seems to manifest the hallucinatory repetition of American history identified by Rossi, in which their condition as 'visions' underlines their imaginary nature. Yet Wayne declares that 'they weren't visions, they were real',[115] suggesting that for him they are more than just visions. We can understand Wayne's belief in their reality in terms of his own experience of American history through recorded images during his childhood in Dublin. The America that Wayne desires is image, or a reality-effect that is maintained by the repetition of idealised images.

We learn later that these projections are deployed by Manson, and Wayne speculates that their purpose was to urge him 'on towards the West, trying to give me strength to cross the Rockies'.[116] This urging appears to work by using the projections to distract Wayne from the grim realities of the apocalyptically transformed environment he is encountering. Indeed, at the point in the journey where Wayne sees these images, he has just escaped from a violent confrontation over a scarce resource – a can of water – in a 'Wild West' theme park. He describes this park as 'a make-believe world already overtaken by a second arid West far wilder than anything those vacationing suburbanites of the late twentieth century could ever have imagined'.[117] This 'second arid West' is far more inhospitable than the one encountered during the early history of the original United States that the theme park seeks to replicate, or the one reproduced later in the minds of the tourists who visited it. This is the arid, climatically transformed 'West' that has been laid waste by the cultures of consumption which defined the industrial modernity of American history. This transformed climate is related again during the crossing of the Rockies themselves, where Wayne encounters 'opalised trees […] the fossilised remains of dense pine forests. Everywhere nature had come to an abrupt dead stop'.[118] It is this reality that Manson's projections of an idealised and heroic 'West' of the cowboy movie seek to obscure, in order to encourage Wayne's narrative of upward mobility towards the waiting Vice-Presidency in Vegas. By projecting them into the sky, Manson is literally mobilising the repetition of these images as a means of re-asserting a particular idea of America and obscuring the reality of the environment in which Wayne finds himself.

This sense of America surviving as a series of repeated simulations of American history is evident in previous readings of the novel by critics such as Veronica Hollinger[119] and Roger Luckhurst.[120] Both of these critics have commented on the links between the novel and Jean Baudrillard's theory of simulacra. Indeed, Hollinger goes so far as to suggest that *Hello America* contains a 'kind of dramatization of Baudrillard's theory of third-order simulacra', in which the dreams of America 'have taken on a life of their own'.[121] Whilst such postmodern readings

substantiate my analysis that the 'America' that exists in Wayne's imagination is an idea maintained by a series of repetitions, they do not associate this process with how Wayne is encouraged to ignore the ecological implications of American industrial modernity. But this is precisely the role of simulacra that the novel constructs; the simulations of simulations of simulations Wayne encounters are like the repetitions of acts through which ideology is reproduced and the implications of the history of American industrial modernity for Wayne's own environmental context are obscured.

This ideological process of obscuring the ecological consequences of America's history of industrial modernity – and the implications of this history for the apocalyptic environment of Wayne's own present – is eventually revealed to Wayne in Vegas when his own dream of becoming President is confronted by the deranged presidential ambitions of Manson. Manson reveals that he has been destroying American cities with nuclear bombs in order to prevent 'disease vectors advancing from the east', a logic that echoes the motives of General Ripper's orchestration of a Nuclear war in *Dr Strangelove* (1964).[122] Manson's desire to re-build America is therefore depicted as including the re-establishment of the nuclear paranoia of the Cold War. As if finally realising that his own American dreams contain the seeds of their own apocalyptic ending, Wayne declares in a key scene that 'These dreams were dead a hundred years ago! All we've done here is build the biggest Mickey Mouse watch in the world. I'm not a real American, not like GM and Heinz and Pepsodent'.[123] This is a critical moment for Wayne; the 'Mickey Mouse watch' is Manson's Vegas, the latest repetition of their shared image of an upwardly-mobile America. By imagining this repetition as a watch that reproduces the image of Mickey Mouse, Wayne draws attention to the simulation of American history that Manson has constructed. The watch is a technological enframing of time that is also framed here as an image of Americana. Indeed, it is 'the whole Mickey Mouse and Marilyn thing' that Wayne previously related to his own 'dreams of a renascent USA', and which the character Paco criticised for being 'crazily impractical, hung up on brand names and […] infantile delusions about unlimited growth'.[124] Wayne's later reference to Mickey Mouse as a watch constructed by Manson therefore relays a specific repudiation of these previous dreams, and what Paco describes as the 'excess of fantasy'[125] that they represented.

In declaring himself as 'not a real American' in this passage, Wayne is expressing his new awareness of the 'delusion' of the unlimited growth of American consumer culture, and the extent to which this delusion was founded upon a fantasy vision of America. This is an awareness of what Stoekl describes as the 'lie' of 'ever increasing production of food and things'[126] that I previously suggested links ideology to its anthropocentric foundations. Wayne's fantasy vision of America was reinforced during his journey to Vegas by his dream of 'upward mobility', and its promise of progressing from 'stowaway to the White House'.[127] But in his climatic encounter with

Manson he comes to realise that it is precisely this 'dream' of what it means to be an American that is not 'real'. The disruption of this dream is underlined by Wayne's declaration that the 'real' Americans are actually the nomadic descendants of Americans who remained behind after the country was abandoned, whose names are derived from former brands such as 'Heinz, Pepsodent, Xerox' and 'GM'.[128] These 'real Americans' have abandoned the industrial modernity of Wayne's 'excess of fantasy' vision of America, and only superficially retain some of its signifiers through their names. In a critical inversion of the logic of manifest destiny, the nomads are the 'real' Americans because their existence reflects the reality of their climatic conditions. More specifically, they reflect the environment of the novel's apocalyptic narrative, which consists of a desert marked by the remnants of Americana. Wayne's rejection of the appellation 'real American', and his transferral of this to the nomads, signals a critical moment in the novel in which he acknowledges the 'real' geologic historical conditions of the novel's future history.

This acknowledgement relays Wayne's emergent consciousness of the profound discordance between the simulation of American history that has underpinned his American dreams of 'Puritan enterprise' and 'upward mobility', and the conditions of geologic history represented by the apocalyptically transformed environment. Significantly, Wayne's awareness of this discordance is allied to a subtle change in his view of the environmental implications of the Bering Dam. Whilst he declares a desire to destroy the dam early in the novel, it is only after meeting Manson that he begins to examine the dam in terms of geologic history. In a diary entry, he describes the dam as 'A piece of exploitation, by the way, a perversion of the 'natural' America, as brutal and self-serving as any of the Hollywood and Marvel Comics fantasies'.[129] This concern for the 'natural' America marks the moment at which Wayne acknowledges that the anthropogenic climate change that has made the country uninhabitable is linked to the very same 'excess of fantasies'[130] that Paco suggested led to the downfall of the United States. In labelling the images and image-producing systems of Hollywood and Marvel Comics as 'brutal' and 'self-serving', Wayne attests to their complicity in this downfall, and gestures towards the ways in which their repetition of 'fantasies' enabled the exploitation of 'natural' America that he is highlighting. The damming of the Bering Straits no longer appears to Wayne simply as an act of exploitation by a foreign power, but rather a consequence of the very American modernity he has been seeking to reconstruct.

It is this realisation that is expressed in his statement that the nomads are now the 'real Americans'. He has finally realised that the American history he idealises cannot be repeated, because the real ecological conditions of this future history will not permit it. Moreover, these are not the conditions under which America first arose to become a superpower; they are instead the conditions which that superpower left behind. These two insights – the dependency of American modernity on particular ecological conditions and the consequences of this modernity for those

conditions – serve to highlight the ways in which the American history that underpinned Wayne's American dreams was itself interconnected with the complex geologic history of the global climate. Such complex interconnections relay a sense of an American history from the westward expansion to the height of its industrial modernity that was not so much manifestly destined as climatically contingent. In recognising this contingency Wayne appears to attain a consciousness of the very same complex interdependency between the human history of American modernity and geologic history that I suggested earlier is relayed to the reader through the speculative future history of the novel.

California Dreamin': Wayne's Final Dream of The Coast

It is Wayne's emerging consciousness of the interdependency between these histories that highlights how he was previously misled by the ideological repetition of an 'hallucinatory' history of America. In the context of current concerns for anthropogenic climate change, this consciousness can be read as ecological in a way similar to that of Kerans; as an understanding of human interdependence upon the biosphere that serves to disrupt what we can now recognise as the anthropocentric foundations of ideology. By depicting the disruptive force of this consciousness within a speculative apocalyptic future history in which modernity is so clearly implicated, *Hello America* sheds light upon the ways in which that modernity simultaneously enacts and obscures the dangerous exploitation of the biosphere as an infinite resource. Furthermore, this future history also draws attention to the contingency of modernity upon those very same climatic conditions of geologic history that it is changing.

Yet towards its end the novel contains a final demonstration of the power of such ideological processes to obscure Wayne's real relationship with the biosphere. After leaving Manson's Las Vegas behind to its own self-destruction, Wayne does not return east towards Europe. Instead, he carries on westwards in a solar-powered aircraft towards 'California and the morning gardens of the west'.[131] As he does so, he concludes that:

> '[…] he would enter the White House one day […] The old dreams were dead, Manson and Mickey Mouse and Marilyn Monroe belonged to a past America […] It was time for new dreams, worthy of a real tomorrow, the dreams of the first Presidents of the Sunlight Fliers.[132]

This ending contrasts with that of *The Drowned World*. Kerans' journey south towards the 'forgotten paradises of the new reborn sun' represented a self-banishment from the conditions of modernity at Camp Byrd and a return to a pre-lapsarian relationship with nature. The 'tomorrow'

to which Wayne believes he is heading promises 'new dreams', in which his symbolic abandonment of the fossil-fuel powered car in favour of the 'sunlight fliers' – which are solar aircraft 'carried in the palm of the sun'[133] – signals a shift in Wayne's conscious relationship with nature. His dream of 'The Coast' is now coloured by a desire for a notion of the 'natural' America, which necessitates the disappearance from the text of the city and the car.

This imagery appears to bring Wayne's final journey close to the Edenic imagery of Kerans' journey. Yet this 'new' dream is not that 'new' after all; the Californian 'morning gardens of the west […]'[134] are still recognisable as a version of the dream of 'Good Life' described by Cullen, specifically the third iteration that he calls 'The Coast'. Indeed, if the symbol of the American Dream of the 'Good Life' at 'The Coast' is 'not the bank, but the beach',[135] then Wayne's journey from the bank of Vegas towards the beach of California enacts a performance of that dream. Cullen's concept of the dream of 'The Coast' describes an ideal in which nature is still enframed by the technological horizon as a resource, even though this technology has a pastoral appearance that makes its technological status appear less visible. In desiring this dream of the 'natural' California, Wayne appears once more to be reproducing a classically American dream. This analysis is underlined by his renewed assertion of one day being President.

It is in framing these 'new dreams' through an image of California that the novel's ending reveals a hidden reserve of anthropocentric thinking. By describing the coast in terms of 'gardens', Wayne reminds us that his pastoral vision of 'nature' is in fact itself manufactured. Whilst his final journey westwards might appear to be a redemptive rejection of the consumerist industrial modernity of the America represented by President Manson's Las Vegas, he continues to reproduce an ideal of a 'garden' in which nature remains enframed as a resource for potential exploitation. What Hollinger has described as Wayne's 'final disappearance into the geography of the simulacrum' [136] at the end of the novel is therefore more of a disappearance into ideology; a repetition of a pastoral ideal whose anthropocentric foundation is so fully naturalised, and which so completely obscures the true conditions of its exploitative relationship with the biosphere, that it appears to Wayne as a natural paradise. The conclusion of Wayne's journey in this re-imagined dream of the 'Coast' is therefore not the elective banishment from modernity achieved by Kerans. Rather, Wayne's escape from an apocalyptic landscape towards an Edenic paradise represents a particularised example of how the anthropocentric foundations of ideology continue to maintain a disconnection between the human subject and the biosphere, even in the face of the anthropogenic climate change depicted in the novel. This disconnection persists, I would suggest, precisely because Wayne's understanding of California remains embedded in a particular anthropocentric assumption that human history will persist; even at the end of his 'old dreams' he perceives a transition rather than a final apocalyptic ending. As we shall now see in an analysis of

Cormac McCarthy's recent apocalyptic novel *The Road*, such assumptions can be both preserved and disrupted by the speculative resources of apocalyptic narratives.

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[1] J. G. Ballard, *The Drowned World* (London: Harper Perennial, 2006), p. 42.
[2] D. L. Royer, R. A. Berner, I. P. Montañez, N. J. Tabor, D. J. Beerling, 'CO2 as a primary driver of Phanerozoic climate', *GSA Today*, 14, (2004), 4-10 (p. 8).
[3] Ballard, *The Drowned World*, p. 17.
[4] Ballard, *The Drowned World*, p. 45.
[5] Ballard, *The Drowned World*, p. 45.
[6] Ballard, *The Drowned World*, p. 45.
[7] Ballard, *The Drowned World*, p. 44.
[8] Ballard, *The Drowned World*, p. 45.
[9] Ballard, *The Drowned World*, p. 44.
[10] Martin Heidegger, 'The Question Concerning Technology', in *The Question Concerning Technology and Other Essays*, trans. by William Lovitt (New York, NY: Garland Publishing, 1977), pp. 3-35 (p. 9-10).
[11] Heidegger, p. 9.
[12] Michael E. Zimmerman, 'Heidegger and Deep Ecology', <http://www.colorado.edu/ArtsSciences/CHA/profiles/zimmpdf/heidegger_deep_ecology.pdf> [accessed 22 October 2012] (p.1).
[13] Like Chakrabarty, Zimmerman is also concerned for how to 'criticize the dark side of technological modernity' in light of environmental crises, whilst also 'furthering and transforming modernity's emancipatory political aims'. See Zimmerman, p.4.
[14] Ruth Irwin, *Heidegger, Politics and Climate Change: Risking It All* (London: Continuum International Publishing, 2008), p 174.
[15] Ruth Irwin, 'Does a Failure in Global Leadership Mean it's All Over? Climate, Population, and Progress', in *Environmental Ethics*, ed. by Michael Boylan, 2nd edn (Chichester: John Wiley & Sons, 2014), pp. 243-56 (p. 249).
[16] Irwin, 'Does a Failure in Global Leadership Mean it's All Over?', p. 250.
[17] Ballard, *The Drowned World*, p. 17.
[18] Ballard, *The Drowned World*, p. 45.
[19] Ballard, *The Drowned World*, p. 45.
[20] Zimmerman, p. 4.
[21] Zimmerman, p. 4.
[22] Ballard *The Drowned World*, p. 45.
[23] Andrzej Gasiorek, *J. G. Ballard* (Manchester: Manchester University Press, 2005), p. 34.
[24] Ballard, *The Drowned World*, p. 61.
[25] Brian Aldiss, *Hothouse* (London: Penguin, 2008).
[26] Peter Brigg, *J. G. Ballard* (Washington: Starmont House, 1985), p. 43.
[27] Rob Latham, 'Biotic Invasions: Ecological Imperialism in New Wave Science Fiction', *The Yearbook of English Studies*, 37 (2007), 103-19 (p. 107) <http://dx.doi.org/10.2307/20479304).
[28] Matthew Gandy, 'The Drowned World: J. G. Ballard and the Politics of Catastrophe', *Space and Culture*, 9 (February 2006), 86-88 (p. 86).
[29] Latham, p. 107.
[30] Latham, p. 107.
[31] Ballard, *The Drowned World*, p. 45.
[32] Ballard, *The Drowned World*, p. 158.

[33] Andrew Ross, 'A Few Good Species', *Social Text*, 46/47 (Spring-Summer 1996), 207-215 (p. 209).
[34] Dipesh Chakrabarty, 'The Climate of History: Four Theses', *Critical Inquiry,* 25 (Winter 2009), 192-222 (p. 206).
[35] Irwin, *Heidegger, Politics and Climate Change*, p. 174.
[36] Ballard, *The Drowned World*, p. 21.
[37] Ballard, *The Drowned World*, p. 45.
[38] Ballard, *The Drowned World*, p. 110.
[39] Ballard, *The Drowned World*, p. 110.
[40] Ballard, *The Drowned World*, p. 110.
[41] Ballard, *The Drowned World*, p. 110.
[42] Genesis 1. 22.
[43] Irwin, 'Does a Failure in Global Leadership Mean it's All Over?', p. 250.
[44] Ballard, *The Drowned World*, p. 44.
[45] Umberto Rossi, 'Images from the Disaster Area: An Apocalyptic Reading of Urban Landscapes in Ballard's "The Drowned World" and "Hello America"', *Science Fiction Studies*, 21 (March 1994) <http://www.depauw.edu/sfs/backissues/62/rossi62art.htm> [accessed 9 October 2011].
[46] Roger Luckhurst, *The Angle Between Two Walls: The Fiction of J.G. Ballard* (New York: St Martin's Press, 1997), p. 53.
[47] Ballard, *The Drowned World*, p. 91.
[48] Ballard, *The Drowned World*, p. 14.
[49] Ballard, *The Drowned World*, p. 44.
[50] Rossi, 'Images from the Disaster Area'.
[51] Rossi, 'Images from the Disaster Area'.
[52] Giorgio Agamben, *Homo Sacer: Sovereign Power and Bare Life*, trans. by Daniel Heller-Roazen (Stanford, CA: Stanford University Press, 1998), p. 7.
[53] Ballard, *The Drowned World*, p. 146-7.
[54] Ballard, *The Drowned World*, p. 147.
[55] Ballard, *The Drowned World*, p. 167.
[56] Ballard, *The Drowned World*, p. 175.
[57] Indeed, in discussing Rachel Carson's *Silent Spring*, Margaret Atwood has identified what she calls 'biblical dominionism', or the moment in Genesis when 'God proclaims that man has dominion over the animals', as the origins of the logic of freedom to 'exploit nature's resources, which were thought of as inexhaustible'. See Margaret Atwood, 'Rachel Carson's Silent Spring, 50 years on', *Guardian*, 7 December 2012 <http://www.theguardian.com/books/2012/dec/07/why-rachel-carson-is-a-saint> [accessed 5 December 2014].
[58] Ballard, *The Drowned World*, p. 175.
[59] Ballard, *The Drowned World*, p. 14.
[60] Ballard, *The Drowned World*, p. 91.
[61] Agamben, pp. 8-9.
[62] Leland de la Durantaye, *Giorgio Agamben: A Critical Introduction* (Palo Alto, CA: Stanford University Press, 2009), p 203. Ebrary ebook.
[63] It is also useful to recall here the substantial influence of Heidegger upon Agamben's thought, which Durantaye traces back to Agamben's earliest move towards philosophy during an unconventional seminar led by Heidegger in 1966. Of particular relevance is the influence, highlighted by Durantaye, of Heidegger's concept of 'Dasein' ('being') upon Agamben's concept of *homo sacer* and bare life. See Durantaye, pp. 234-5.
[64] Ewa Plonowska Ziarek, 'Bare Life', in *Impasses of the Post-Global: Theory in the Era of Climate Change, Vol.2,* ed. by Henry Sussman (London: Open Humanities Press, 2012) <http://dx.doi.org/10.3998/ohp.10803281.0001.001>.
[65] Ballard, *The Drowned World*, p. 14.

[66] Louis Althusser, 'Ideology and Ideological State Apparatuses (Notes towards an investigation)' in *Mapping Ideology*, ed. by Slavoj Žižek (London: Verso, 1994), pp. 100-40 (pp. 123-4).
[67] Sean Homer, *Jacques Lacan: Routledge Critical Thinkers* (Oxford: Routledge, 2005) p. 113.
[68] David Hawkes, *Ideology*, 2nd edn (London: Routledge, 2003), pp. 120-1. Kindle ebook.
[69] Althusser, p. 110.
[70] Allan Stoekl, '"After the Sublime," after the Apocalypse: Two Versions of Sustainability in Light of Climate Change', *diacritics*, 41 (2013), 40-57 (p. 43) <http://dx.doi.org/10.1353/dia.2013.0013>.
[71] J. G. Ballard, *Hello America* (London: Harper Perennial, 2008), p. 46.
[72] Andy Sawyer, 'Future History', in *The Routledge Companion to Science Fiction*, ed. by Mark Bould and others (Oxford: Routledge, 2009), 489-93 (p. 490).
[73] Sawyer, p. 492.
[74] Ballard, *Hello America*, p. 46.
[75] Ballard, *Hello America*, p. 43.
[76] Ballard, *Hello America*, p. 44.
[77] Rossi, 'Images from the Disaster Area'.
[78] Ballard, *Hello America*, p. 12.
[79] Ballard, *Hello America*, p.8.
[80] Ballard, *Hello America*, p. 7.
[81] Ballard, *Hello America*, p. 9.
[82] Ballard, *Hello America*, p. 41.
[83] Margaret Bourke-White, *At the Time of the Louisville Flood*, photograph, 1937.
[84] Nicholas Mirzoeff, 'The Sea and the Land: Biopower and Visuality from Slavery to Katrina', *Culture, Theory and Critique*, 50 (2009), 289-305 (pp. 300-1) <http://dx.doi.org/10.1080/14735780903240331>.
[85] Ballard, *Hello America*, p. 42.
[86] The extent to which the extinction was a result of climate change or the arrival of anatomically modern humans in North America remains a subject of debate. See for example Alice Roberts, *The Incredible Human Journey* (London: Bloomsbury, 2009). Kindle ebook.
[87] Ballard, *Hello America*, p. 42.
[88] Ballard, *Hello America*, p. 46.
[89] Ballard, *Hello America*, p.41.
[90] Ballard, *Hello America*, p. 9.
[91] Travis Elborough, 'Pax Americana', in *Hello America*, J. G. Ballard, pp. 9-10 (p. 9.).
[92] Ballard, *Hello America*, p. 4.
[93] Rossi, 'Images from the Disaster Area'.
[94] Rossi, 'Images from the Disaster Area'.
[95] Ballard, *Hello America*, p. 50.
[96] Jim P. Cullen, *American Dream: A Short History of an Idea That Shaped a Nation* (Cary, NC: Oxford University Press, 2003). Cullen also describes several other 'American Dreams' that have appeared across American history, but it is the thread of the dream of the 'good life' that is particularly useful for understanding Wayne's journey.
[97] Cullen, p. 11.
[98] Cullen, p. 8.
[99] Cullen, p. 9.
[100] See also Lois Tyson, who takes the Althusserian model as a starting point for her *Psychological Politics of the American Dream,* in which she seeks to understand how this process is evidenced in American literature. See Lois Tyson, *Psychological Politics of the American Dream: The Commodification of Subjectivity in Twentieth-century American Literature* (Michigan, OH: Michigan State University Press, 1994), p. 1.
[101] Ballard, *Hello America,* p. 49.

[102] Ballard, *Hello America*, p. 37.
[103] For example, James Olson and Heather Beal have noted that the Eighteenth Century legal principal of 'superior use', which asserted that Europeans 'could make a better use of land than native peoples and therefore deserved sovereignty', was the legal precursors of the seminal US Supreme Court decision on Native American land rights in *Johnson v. M'Intsoh* that 'prepared the way for Manifest Destiny'. See James S. Olson and Heather Olson Beal, *The Ethnic Dimension in American History*, 4th edn (Chichester: John Wiley & Sons, 2010), p. 66.
[104] This logic also prefigures the global enframing of the biosphere as a resource observable today. As anthropologists have recently observed, a contemporary tendency towards 'environmental colonialism' as a means of hiding the consequences of pollution and the 'dumping' of the by-products and waste of industrial modernity has striking parallels with the colonial appropriation of territories and resources. See Hans Baer and Merrill Singer, *The Anthropology of Climate Change: An Integrated Critical Perspective* (Abingdon: Routledge, 2014), pp. 86-7.
[105] Ballard, *Hello America*, pp. 49-50.
[106] Ballard, *Hello America*, p. 78.
[107] This term was used by the economist Kenneth E. Boulding in his metaphorical allusion to the 'cowboy economy' in his famous essay 'The Economics of the Coming Spaceship Earth'. For Boulding, the 'cowboy economy' is symbolic of 'illimitable plains' and 'exploitative behaviour' that he associates with modern practices of production and consumption. This contrasts with the 'spaceman economy' that must view the Earth as a 'single spaceship'; an isolated system within which the capacity for extracting resources or disposing of pollution are limited. If the spaceship economy gestures towards thinking of the planet as a biosphere upon which human species life depends, then the cowboy economy is indicative of a deliberate ideological obfuscation of these conditions of existence. See Kenneth E. Boulding, 'The Economics of the Coming Spaceship Earth', in *Radical Political Economy: Explorations in Alternative Economic Analysis*, ed. by Victor D. Lippit (London: Routledge, 1996), pp. 357-67 (pp. 362-3).
[108] Joachim Radkau, *Nature and Power: A Global History of the Environment* (Cambridge: Cambridge University Press, 2008), pp. 179-180.
[109] Cullen, p. 8.
[110] Ballard, *Hello America*, p. 205.
[111] Ballard, *Hello America*, pp.132.
[112] Ballard, *Hello America*, pp.132-3.
[113] Ballard, *Hello America*, p. 104.
[114] Ballard, *Hello America*, p. 104.
[115] Ballard, *Hello America*, p. 104.
[116] Ballard, *Hello America*, p. 137.
[117] Ballard, *Hello America*, p. 95.
[118] Ballard, *Hello America*, p. 108. The image of 'opalised trees' also recalls the apocalyptic transformation of the jungle into crystal structures in Ballard's earlier *The Crystal World*. See J. G. Ballard, *The Crystal World* (London: Fourth Estate, 2014), p. 75.
[119] Veronica Hollinger, 'Travels in Hyperreality: Jean Baudrillard's *America* and J. G. Ballard's *Hello America*', in *Functions of the Fantastic: Selected Essays from the Thirteenth International Conference on the Fantastic in the Arts*, ed. by Joe Sanders (Westport, CT: Greenwood Press, 1995), pp. 185-194.
[120] Luckhurst, *The Angle Between Two Walls*, pp. 141-50.
[121] Hollinger, p. 191.
[122] *Dr Strangelove*, dir. By Stanley Kubrick (Columbia Pictures, 1964). Like Manson, Ripper is of course also named after an infamous murderer.
[123] Ballard, *Hello America*, p.207.
[124] Ballard, *Hello America*, p. 140.
[125] Ballard, *Hello America*, p. 140.

[126] Stoekl, p. 43.
[127] Ballard, *Hello America*, p. 12.
[128] Ballard, *Hello America*, p. 100.
[129] Ballard, *Hello America*, p. 146.
[130] Ballard, *Hello America*, p. 140.
[131] Ballard, *Hello America*, p. 222.
[132] Ballard, *Hello America*, p. 224.
[133] Ballard, *Hello America*, p. 220.
[134] Ballard, *Hello America*, p. 222.
[135] Cullen, p. 160.
[136] Hollinger, p. 191.

Chapter 2: Environmental Apocalypse and the End of the Anthropocene in Cormac McCarthy's *The Road*

> *The apocalyptic narrative is one way in which literature can carry out its necessary self-reinvention in a time of terror, one way in which contemporary literature can "mislead the vigilance" of global capitalism and American hegemonic discourse and produce narratives that challenge and critique our world.*[1]

Like the drowned world and the American desert in the two Ballard novels discussed in the previous chapter, Cormac McCarthy's 2006 novel *The Road* evokes the environmental and human consequences of climate change through an image of an apocalyptic landscape. But unlike those earlier texts, *The Road* presents readers with a planet that is virtually uninhabitable. It is blasted and burned by an unnamed cataclysm that occurred several years earlier; animal and plant life have been destroyed and the sky is permanently dark. There are no state institutions or traditional forms of civil society. A small number of humans still survive, but society has collapsed and the dwindling population lives either as cannibals or scavengers. The significance of this particularly stark depiction of apocalypse, and how it serves as a means of productively thinking through the inextricable relationship between the biosphere and human survival, is the focus of this chapter. In examining these aspects of the text, I expand and develop the ideas of geologic history and the Anthropocene discussed in the previous chapter. I also suggest that the novel's speculative account of a fragmented and disorientating world 'without a biosphere'[2] provides a way of thinking through the anthropocentric subtexts of apocalypse itself.

This specific form of apocalypse presented in *The Road* is of particular importance to understanding the novel's distinctive contribution to understanding the experience of anthropogenic climate change in the Anthropocene. The previous chapter considered how two of Ballard's apocalyptic science fiction novels mobilised specific narrative and generic strategies in order to think through the hidden anthropocentric assumptions of humanity's relationship with the biosphere. But for all of the valuable insights that texts such as *The Drowned World* and *Hello America* provide for understanding this relationship – and the ways in which it is obscured – their narrative conception of apocalyptic 'endings' was clearly marked by a Cold War concern for an imminent end of history. In this sense, they remain embedded in an understanding of apocalypse as an identifiable historical moment at the end of history. This understanding highlights a striking discontinuity between the imminent prospect of nuclear war that marked the context of the Cold War, and the immanent, or current and on-going, condition of anthropogenic climate change that

marks the Anthropocene. Indeed, both the solar activity of *The Drowned World* and the resource depletion and geoengineering of *Hello America* suggest a coherent ending to history that encourages readers to imagine the apocalypse itself as part of an imminent future.

To some extent this marking of apocalypse with an identifiable end of history can also be said to be true of more recent texts written in the context of climate change consciousness. The apocalyptic narrative of Margaret Atwood's *Oryx and Crake*, for example, registers a sense of immanent environmental changes in the descriptions of increased temperatures and rainfall provided through the memories of 'Snowman-Jimmy'. Yet this apocalyptic narrative still pivots around the future historical events of Crake's planned release of a virus. The majority of the narrative weight of the text details the approach of this event and frames it as an outcome of the current historical context. We can read *Oryx and Crake* and imagine that this is an imminent future outcome of current technoscience that will herald the end of human history as an intelligible historical moment.

By contrast, I suggest in this chapter that the self-conscious use of apocalyptic generic resources and narrative conventions in *The Road* work to re-imagine the sense of an apocalyptic ending in the spatial and temporal context of the Anthropocene. This re-imagining registers a sense of the immanence of the Anthropocene – its presence with us now – but it also provides a powerful account of the implications of thinking about human relationships with the biosphere in terms of anthropocentric views of historical coherence and the enframing of nature in human systems of meaning. In registering these implications, I argue that *The Road* challenges anthropocentric views of human history and the traditional narratives of apocalypse that otherwise serve to reinforce them.

Reading *The Road* in the Era of Climate Change

Whilst *The Road*'s setting is clearly environmentally apocalyptic, the significance of this setting in a work of contemporary fiction published in the context of the crisis of anthropogenic climate change has been a subject of debate amongst commentators and critics. The novel itself is not part of the same tradition of science fiction as Ballard's novels, and this perhaps invites broader readings of McCarthy's use of apocalypse. Indeed, in reviewing the novel for the *New York Review of Books*, Michael Chabon has noted how apocalypse provides writers wishing to avoid the 'demand for baroque inventiveness imposed by other kinds of science fiction'[3] with a way to nonetheless imagine radically changed societies and explore the implications of such changes. Chabon is therefore critical of the idea of *The Road* as McCarthy's 'turn towards science fiction',[4] declaring the novel instead to be a form of epic horror. As evidence he cites a number of key aspects of the novel's imagery and narrative structure that he associates with both epic and horror

traditions, in particular the visceral nightmares of cannibalism and the journey through the 'underworld' of the barren landscape by the novel's focalising characters: the 'man and the boy'. Yet this distinction belies a wider point, which is that the novel draws upon the generic conventions and tropes of multiple genres. Of these, the novel's specific, measured and, at times, reflexive use of the apocalyptic draws attention to how imagining the Anthropocene involves thinking about an end to human history in ways we are not accustomed to. This mobilisation of apocalypse is key to *The Road*'s sense of the 'changed nature of society in the wake of cataclysm',[5] an aspect Chabon identifies as science fictional.

Other commentators have emphasised the thematic timeliness of the novel's depiction of catastrophic changes to the global climate. George Monbiot described *The Road* in *The Guardian* as 'the most important environmental book ever written',[6] in a reading that assumes that the novel is 'about' environmental crisis in a way he relates to Rachel Carson's popular science book *Silent Spring*. This reading approaches the novel as a realist representation of the world after environmental collapse, and so describes it in terms of a kind of dramatized documentary that he compares to a then recently published UN report on the state of the planet. For Monbiot, *The Road*'s 'world without a biosphere'[7] seems to be a straightforward depiction of the final consequences of the human destruction of the environment forewarned in this report. This reading implies that the novel's apocalypse serves a political purpose in forewarning readers of the dangers of climate change.

However, we should be cautious of reading McCarthy's novel too superficially. As Adam Trexler and Adeline Johns-Putra highlight in their survey of Climate Change Literature,[8] interest in the novel has ranged from Monbiot's view that it is an 'environmental book', to the response of critics such as Rune Graulund, who specifically opposes Monbiot's view because the cause of the apocalypse is unknown and indeed 'we are not meant to know'.[9] Graulund's objection to Monbiot's reading assumes that this unknowable cause undermines any political value in reading the novel in terms of climate change, beyond a possible and imprecise 'warning to protect and cherish the planet'.[10] Instead, Graulund suggests that the cause of the apocalypse is unimportant to a reading of the novel, and so calls attention to the 'inescapable and massive presence'[11] of the cataclysm that, like the image of desert that he offers as a way of understanding the text, simply 'is'. Readings such as Graulund's provide useful insights into the literary strategies of the text and relate it fruitfully to other texts by McCarthy. However, I want to suggest that rather than corroborating the case against climate-change readings, these aspects of the text form part of its more substantial literary contribution to understanding anthropogenic climate change.

One of the most significant of these aspects is identified by Ashley Kunsa in her analysis of the text's pared-down language and the man's quest for meaning and patterns.[12] As Kunsa notes, McCarthy is well known for his use of sparse prose and a plurality of interpretations that resist

totalising meanings, as well as what Vereen M. Bell described as his 'metaphysic' of 'no foundational principles, no foundational truth'.[13] In *The Road*, this style disrupts the expectations of critics such as Graulund that a literary response to climate change will present a realist and didactic depiction of climate change's anthropogenic material causes. These expectations are rooted in a tradition of apocalyptic fiction that overtly warns the reader of impending or on-going doom: a tradition that is exemplified in aspects of Ballard's *The Drought* (1965) or T.C. Boyle's *A Friend of the Earth* (2000), which illustrate how industrial modernity has or is changing the climate.

McCarthy's distinctiveness from this tradition is important because fictions that emphasise how a particular cause of climate change might produce an apocalyptic outcome could be said to reinforce a critical tradition of understanding apocalyptic texts as a way of thinking about human history rather than as a response that poses a threat to the very future of that history. This tradition is often associated with Frank Kermode's account of apocalyptic anxieties in both fiction and culture in *The Sense of an Ending*.[14] In this book, Kermode suggests that apocalyptic stories should be understood as reflecting a cultural need to imagine ourselves always at the end of history. This need is borne out of a sense of living through constant transition in the 'middest' of history; indeed, Kermode suggests that we continually reproduce apocalyptic stories that frame our current moment as being at the end of history in order to achieve a sense of historical coherence.[15]

Kermode's emphasis on apocalypse as a means of thinking about history is important in approaching the way in which apocalyptic fiction might encourage readers to think about climate change, because it privileges a theory of historical coherence above the possibility of an actual end. This privileging implies that anthropogenic climate change is just another crisis that serves a historical role but which does not actually itself represent a threat. Such view of climate change as only ever a historical concern is reminiscent of some of the claims of climate change denial, which operates in part by attempting to mobilise a perception that climate change is 'is just another run-of-the-mill doomsday fantasy, one that "green capitalism" will soon dispel'.[16] Furthermore, because Kermode asserts that we are in the 'middest' of history, his theory continuously defers an end so that human history begins to look infinite. There is no account of the origin or end of human history as actual historical moments,[17] and so there is no way for this view of human history to locate such moments within what we now think of as geologic history. In this sense, the 'modern apocalypse' can even appear as a way of enframing history itself as a form of infinite resource for human consumption.

Kermode's account of apocalypse informs a way of reading apocalyptic fiction that is therefore ill-equipped to analyse the current literary response to anthropogenic climate change. By failing to take account of how human history is inextricably entwined with a geologic history

that does encompass the origin and end of humanity, it reinforces the facile distinction between human and geologic histories. Reviewers and critics alike might also inadvertently reproduce a view of apocalyptic texts that invites this inadequate analysis and which runs the risk of reinforcing an anthropocentric view of human history, society and culture. Such problematic readings proceed in part from the same difficulties of scale identified by Timothy Clark in his essay 'Derangements of Scale'; the scale of human species history within geologic time is ignored in the analysis of apocalypse offered by critics such as Kermode. Indeed, in light of Clark's essay we can understand Kermode's account of apocalypse as part of a tradition of literary criticism in which texts are read only at scales that appear to 'make sense'[18] within the confines of a liberal democracy that is 'structurally committed to a process of continuous economic growth'.[19] This way of reading is what Clark suggests 'may now be a form of intellectual and ethical containment' that elides those encounters with the 'unfamiliar shapes'[20] of human history and culture – as viewed from geological historical perspectives – that are urgently needed in thinking about anthropogenic climate change.

In responding to this problem of reading texts in the era of anthropogenic climate change, Clark proposes multi-scale readings, and in particular 'futural' readings that underline the 'fragility and contingency of effective boundaries between public and private, objects and persons, the "innocent" and "guilty," human history and natural history, the traumatic and the banal'.[21] In a similar vein, I propose a reading of *The Road* that identifies how the text's speculative account of a 'world without a biosphere' serves to reframe humanity as a historically finite species within a much longer geologic history. This reading resonates with Clark's call for a literary analysis that encompasses multiple scales because it draws attention to the power of such scales to defamiliarise assumed relationships between human and biosphere. For example, my reading identifies how the spatial and historical scale of late-twentieth century America – as relayed in *The Road* by allusions to the American road novel – is defamiliarised through the movement between this scale and the geologic scale of the futurity of the eponymous road itself in ways that complicate traditional literary boundaries between 'human' and 'natural' history, and 'the traumatic and the banal'. Through this multi-scaled reading, my analysis of *The Road* considers how the absence of a functioning biosphere embodies a fatal disconnection from biological nature, and how McCarthy's sparse language and the relaying of a fragmented world invite the reader to imagine the distinctive kind of 'end' of familiar human history that this disconnection discloses. It is this distinctive end that disrupts the repetition of anthropocentric thinking that underpins the ideology of late capitalist industrial modernity in the era of the Anthropocene.

The Road as 'Modern Apocalypse'

In order to understand this distinctive end, we must first sketch out how the text might be read in the critical tradition suggested by what Kermode called the 'modern apocalypse'. In *The Sense of an Ending*, Kermode describes a contemporary sense of living in 'perpetual transition' through which we 'mak[e] sense of the world'.[22] This 'making sense' is elsewhere associated by Kermode with 'our deep need for intelligible Ends', which he relates to a number of phenomena such as the 'scholarly' tendency for defining historical 'epochs'.[23] But perhaps the most enduring form of 'ending' in Kermode's analysis is the Judaeo-Christian apocalyptic tradition, and even more specifically the book of *Revelation* that ends the 'familiar model of history' of the Christian Bible.[24] This sense of an ending is readily identifiable in *The Road* in a series of biblical allusions – both symbolic and narrative – which appear to locate the novel within a Judeo-Christian tradition of apocalyptic story telling. The most obvious of these allusions is the presence of biblical apocalyptic imagery, such as the disruption of the environment and the ruination of the city, which seems to constitute a forewarning of imminent apocalypse. Indeed, Carl James Grindley has suggested that the novel's apocalyptic setting can be read as a 'document of the so-called Tribulation of Judeo-Christian mythology' in which the events predicted in *Revelation* have come to pass.[25]

The Road's numerous references to familiar items such as trucks, trains, magazines, and telephones invites readers to re-think this biblical apocalyptic promise of an imminent end within the context of the modernity with which they are familiar. In one example of these familiar items, the man and boy encounter an abandoned diesel-electric train. Sitting in the locomotive, the man makes 'train noises and diesel horn noises but he wasnt [*sic*] sure what these might mean to the boy'.[26] The man's train noises are an echo of the recent world of diesel electric trains that we also recognise, whilst the boy's incomprehension of these noises renders that world as having ended. This scene therefore underlines how the novel's biblically apocalyptic imagery is associated with the modern world. Indeed, through a close analysis of 'keywords' in the novel relating to the technology-in-ruins which the man and boy encounter, Oliver James Breary has even suggested that the novel's apocalyptic event most likely occurred between 1985 and 1991.[27] Such a period would actually place the novel in the past from the perspective of its readers. This analysis is not definitive because it relies on identifying temporal markers that are not themselves absolutely defined. But the text nevertheless conveys an impression that the world which has ended with an apocalyptic event is the world familiar to the reader.

The novel's allusions to a recent historical context for the apocalyptic event can be interpreted as gesturing towards a perception of the current moment as coeval with an imminent end to human history. Relayed through the biblical apocalyptic imagery identified by Grindley, this end can also be read as a re-imagining of the biblical apocalyptic tradition that relays

contemporary anxieties about anthropogenic climate change as an historical ending. Such contemporary anxieties are registered with particular resonance in a scene where the man recalls the last time he heard migratory birds overhead: he describes their 'half muted crankings miles above where they circled the earth as senselessly as insects trooping the rim of a bowl'.[28] This image of lost birds senselessly searching for a place to land suggests a fundamental transformation of nature, in which even a migratory bird's sense of space and time has been undone. The lingering silence that follows – the man 'never heard them again' – is suggestive of a sense of fragile nature and an end of seasons that recalls the auditory imagery of 'silence' in Rachel Carson's *Silent Spring*.[29]

However, in light of Kermode's reflections on 'modern apocalypse', we might further consider the novel's apparent use of apocalyptic imagery to relate contemporary environmental anxieties as simply the latest manifestation of the sense of 'perpetual transition' through which we seek to *imagine* ourselves as always inhabiting a position at an end of history. Such a reading is not particularly satisfactory, however. This is partly because, as I demonstrate shortly, McCarthy's novel does not support superficial interpretations of its imagery, but instead registers a more profound sense of an apocalyptic ending that disrupts the very repetition of the 'modern apocalypse'. But 'modern apocalypse' also provides an unsatisfactory reading of the novel because it works to reinforce a narrative of human history in which endings are continually deferred. As Leo Bersani noted in his contemporary review of *The Sense of an Ending* in 1967, Kermode's 'modern apocalypse' provides no means by which literature might enable or signal change.[30] There is no possibility of radical resistance to the historical narrative, or the subversion of 'hegemonic discourse' suggested by Sarah Dillon in her reading of apocalypse in Maggie Gee's *The Flood*.[31] Neither do such texts appear capable of articulating climate change as an actual crisis, since Kermode's account of history tends to theorise such a crisis out of existence. When read in light of Kermode's account of apocalypse, *The Road*'s climate apocalypse appears to be reduced to the status of just another apocalyptic re-imagining of the end of history that simultaneously forecloses any actual end.

The critical tradition suggested by Kermode's view of apocalypse therefore represents a kind of rhetorical trap in which there is no way to imagine the end of human history, because such an end is framed as a mere fiction. This interpretation of apocalyptic stories as simply the latest in a long tradition is itself repeated across Kermode's literary historical narrative and becomes naturalised and assumed. Yet in foreclosing the possibility of an end to history ever really occurring, such rhetoric tends to frame human history as unexpectedly eternal. Indeed, we might identify Kermode's whole concept of the 'modern apocalypse' as the repetition of an ideological act that encourages readers of apocalyptic stories to view apocalypse as an event that is never encountered. In this respect, Kermode's modern apocalypse continuously reproduces the

anthropocentric distinction between geologic history – in which humans occupy but one transitory moment – and human history. In overlooking the complex interdependencies between these histories, the 'modern apocalypse' then begins to appear as part of the anthropocentric foundation of ideology discussed in the previous chapter.

Clearly such an approach to apocalypse is unable to account for how an apocalyptic narrative such as *The Road* might address the implications of the Anthropocene for thinking differently about the relationship between human and geologic histories and understanding anthropogenic climate change. But a way to read the novel in this way is offered by the different approach to apocalypse that is proposed by Jacques Derrida in his essay 'Of an Apocalyptic Tone Newly Adopted in Philosophy'.[32] In this essay, Derrida makes a distinction between the future as predictable, which he calls *futur*, and the future as something unknowable and incalculable, which he calls *avenir*. For Derrida, *futur* is characterised by the announcement of apocalypse, rather than the apocalypse itself. Derrida suggests that Total Nuclear War, the particular 'sense of an ending' prevalent at the time of Kermode's writing, was an example of *futur* because it was announced but never occurred. By contrast *avenir* suggests a form of future that is 'the announcement itself';[33] an unknowable event like 9/11 that did come, but as Baudrillard noted, did so 'unexpectedly'.[34]

Derrida's distinction between *futur* and *avenir* is particularly relevant to *The Road* because of the absence of an 'announcement' suggested by the ambiguity of the disaster, which is never described except, as we shall see presently, through vague and fragmented flashbacks. I would suggest that it is from the expectation of reading the novel as a prediction, or 'announcement' of climatic apocalypse that Graulund mistakes the lack of an identifiable apocalyptic cause in *The Road* for an absence of politically relevant response to anthropogenic climate change. After all, how can the novel have anything to say about the human causes of climate change if the cause within the text is never explained or even identified as human? This is an appeal to the apparent lack of a definitive anthropogenic cause within the text that would superficially forewarn readers that a particular climate change scenario would cause some predicted and imminent outcome.

I would like to suggest that it is precisely the very 'unknowable and incalculable' aspects of the apocalypse in *The Road* that serve to enable the text to imagine a non-anthropocentric vision of climate change in a post-human world.[35] I will now demonstrate how by withholding a coherent account of the apocalypse's cause – through a variety of literary techniques – McCarthy's text registers the apocalyptic happening-without-announcement of *avenir*.[36] This analysis allows us to understand the text as a mode of apocalypse distinct from that anticipated by the critical tradition of Kermode, because Derrida's concept suggests an apocalyptic form that disrupts the coherent but anthropocentric account of a discrete human history that Kermode describes. In disrupting this anthropocentric view of human history, the text also challenges the facile

separation of human and geologic histories identified by Chakrabarty and hints at a non-anthropocentric vision of environmental apocalypse.

'A Formless Age' – Registering *Avenir* in the World of *The Road*

In order to understand how the novel registers the apocalypse of *avenir*, we must first identify the particular ways in which it relays its apocalyptic narrative as 'unknowable and incalculable'. The techniques through which this is achieved centre around a key preoccupation in the novel, to which the non-climate change analysis of Kunsa also gestures. Namely, the disruption of systematic representations of the world, and the absence or disappearance of the systems of meaning by which humans have sought to make sense of a chaotic reality. This concern is reflected metafictionally in McCarthy's style, which mobilises free indirect speech, sudden time shifts, and grammatical sparsity to produce a form of writing that reflects the collapse and disintegration of society and infrastructure that the novel elsewhere describes. Following in the modernist traditions of writers such as Beckett, this form of writing evokes the disappearance of structure and meaning at the end of the world by reflecting the progress of this disappearance in the textuality of the novel itself.

The significance of such a textual form is underlined in the passage where the man attempts to articulate his awareness of an end that cannot itself be articulated. He speaks of 'The world shrinking down about a raw core of parsible entities. The names of things slowly following those things into oblivion'.[37] This passage links the end of the world – of both the biosphere and humans – with the disappearance of those things that can be 'parsed': that can be communicated or articulated, read and understood. These extra-linguistic referents are both concrete things, such as 'things to eat', and more abstract ideas, such as 'things once believed to be true'.[38] When these things disappear their referents also disappear. Through this passage, the text suggests that the possibility of language and articulation – of the man being able to 'think of something to say'[39] – is dependent upon the biosphere and is tied to its apocalyptic destruction. In this way, the text signals the difficulty of articulating a world after such an apocalyptic end of humanity and the biosphere.

This difficulty is also relayed in a scene in which the boy plays 'a formless music for the age to come'[40] on his flute. This music hints at an eventually 'formless' world that the man anticipates existing once all the 'parsible entities' have disappeared. Such a world would have no language, as the source of language in the human ordering of nature would no longer exist. The material reality of nature would be free of categorisation and sign-making and no longer enframed by technology or science. This end to the human enframing of nature is hinted at further in a passage that describes how 'the bleak and shrouded earth went trundling past the sun and returned again as

trackless and unremarked as the path of any nameless sisterworld in the ancient dark beyond'.[41] This image of the 'trackless and unremarked' Earth relays a sense of nature outside of anthropocentric enframing, in which the Earth merely exists in a physical state akin to the lifeless and nameless state of the billions of undiscovered planets in the 'ancient dark' of the Universe's unknown history. The word 'trackless' in particular registers a sense of the Earth as no longer enframed by human spatial and temporal markers of its orbit, whilst 'unremarked' suggests an absence of categorisation or naming. This is an image of the Earth that foregrounds what Allan Stoekl has described as 'a base matter that constitutes us in our indifferent absence to ourselves',[42] or more prosaically as that which exists 'irrespective of our cult of human reason'.[43] This Earth exists outside of the enframing of nature by humans that we have previously seen is anthropocentrically reproduced within industrial modernity.

In this sense, we can understand the text as attempting to describe a world beyond the human history of this modernity in which the anthropocentric enframing of nature through technology described by Heidegger is being undone. If the destruction of the world has heralded the destruction not only of the technology through which nature was enframed, but also signals the end of the language of this enframing, then this is an apocalypse that is quite specifically counter-anthropocentric. In light of this counter-anthropocentrism, the sparse style of the narrative can be read as an attempt to find a literary language with which to articulate an un-enframed environment by approaching in prose something akin to the formless music played by the boy. This is what Gabriella Balsi has identified as the novel's move 'towards a non-anthropocentric vision of nature's language'.[44] Yet whilst music can dispense with all signs and still function, language can only register and suggest a mode of articulation that even *The Road*'s austere textuality cannot finally attain. Nevertheless, McCarthy's sparse textual style in the novel suggests an attempt to approach an articulation of the dying world through a 'shrinking' textuality that gestures towards an embodiment of the apocalyptic ending that it names.

On The Road: Disrupting the Space-Time of *The Road*

This textuality begins to register a disruption of the coherent historical narrative – which Kermode proposes serves to 'mak[e] sense of the world' – that I have suggested problematically imagines apocalypse as an imminent but continually deferred end to history. But this disruption of a coherent historical narrative is not straightforward. Clearly the novel itself retains a certain narrative coherence, in that there is a beginning, middle and end. But more significant are the ways in which McCarthy's narrative structure is reminiscent of the classic American 'road novel', in which the road itself usually functions as a coherent Bakhtinian chronotope of this narrative journey. Bakhtin himself describes a type of 'road' chronotope in which the 'unity of time and

space markers is exhibited with exceptional precision and clarity'.[45] As a literary chronotope, a road can be seen to emphasise a structured relationship between space and time because it registers both spatial 'markers' in the structuring of the world over which a journey along the road takes place, and temporal markers in the structuring of time during which that journey takes place. In both its form and function, the road implies a structuring of space-time through the movement of a journey over it, which marks distance (space) over time.

Such structuring is exemplified by novels such as Jack Kerouac's *On The Road* (1957). Alex Albright suggests that Kerouac's novel utilises Bakhtin's chronotope of the road to 'permit everyday life to be realized within [the] narrative', but that this everyday is interrupted by 'adventure time'.[46] Albright's reading of Kerouac's novel emphasises the road as the 'wilderness' of modern America, which he relates to Emerson's Massachusetts woods,[47] and as a means of registering the boundaries of America, within which its main characters 'bounce off'.[48] This idea of the American road journey as a way of encountering the American wilderness, and through it perceiving the very idea of America, is also apparent in Kerouac's own claim that the journeys that his book fictionalises were an attempt to 'find' modern America, which he defined as 'post-Whitman'.[49] This symbolic attempt to find America is also reflected in Hunter S. Thompson's later claim to be seeking the American Dream in *Fear and Loathing in Las Vegas* (1973), except that it is arguably a post-Kerouac/beat America that is being sought in this later book. In both Kerouac and Thompson though, the discovery of differing conceptualisations of America in the journey through an American wilderness implies that the chronotope of the road encompasses a particular anthropocentric enframing of that wilderness through which the idea of America is structured. Indeed, this structuring is also invoked in Wayne's reimagining of westward expansion as a road narrative in the post-industrial America of *Hello America*.

Yet like the journey into a very different (and non-American) kind of wilderness by Kerans in *The Drowned World*, the man and boy's journey along the road in McCarthy's eponymous novel is marked by the *loss* of a structured vision of nationhood and an alienation of the everyday. The road structures their journey both spatially and temporally, but in a manner that disrupts coherent representations of space and time. If the traditional Bakhtinian chronotope of the road involves a realisation of 'everyday life' that is interrupted by 'adventure time', then the road in McCarthy's text inverts this form. The road crosses a country that we interpret as America, but which is never definitively identified as such. A coherent sense of national history is therefore absent in the wilderness of this road. Instead, we are left with fragments of the vanished everyday life of a consumer culture that serve to interrupt the unfamiliar apocalyptic space-time of the man and boy's journey. When, for example, the man finds a can of Coca Cola hidden amongst the internal workings of a vending machine, his reaction to this otherwise familiar object is one of disorientation:

> He sat and ran his hand around in the works of the gutted machines
> and in the second one it closed over a cold metal cylinder. He withdrew
> his hand slowly and sat looking at a Coca Cola.
> What is it, Papa?
> It's a treat. For you.
> What is it?[50]

The boy's unfamiliarity with this mass-produced object of American consumer culture is only slightly more incredulous than the man's reaction to finding it. He sits looking at the can, almost unbelievingly, as if he has just discovered a semi-mythical artefact. The can of Coke would have been a commonplace marker of 'everyday life' in the road novels of Kerouac or Thompson. But in the now time of McCarthy's novel, the man and boy's encounter with this last vestige of American consumer culture is rendered as an uncanny experience. The can of Coke is framed as an alien object out of sync with the post-human space-time of the road. The man does not even name the object in answer to the boy's question. As the boy himself notes, he 'won't ever get to drink another one'.[51] That which was once mass produced and everyday is now unique and vanishing from existence and language.

This reframing of previously familiar objects of Americana as disruptive objects within the man and boys journey can be understood as a part of the text's disruption of the 'everyday life' of the American road novel. Such disruption is further illuminated by the alienation of nature identified by Nora Kestermann in her comparison of McCarthy's novel and Emerson's 1836 essay 'Nature'. Kestermann describes this contrast as 'Transcendental Dreamscape versus Apocalyptic Nightmare' and identifies points of continuity between Emerson's 'idealistic concept of American nature' and *The Road*.[52] But these continuities are subverted by the 'confusion and disorder' of the novel's apocalypse, so that the 'unity of the divine, nature, and the self' is destroyed 'from the inside by […] the human being itself'.[53] In this way, McCarthy's novel appears to undermine a particularly American view of nature after Emerson that is reproduced in subsequent imaginings of nature in American literature and culture. It is precisely this Emersonian 'wilderness' that Albright associates with the chronotope of the road in Kerouac, and it is in this Kerouacian road-as-wilderness that we encounter American consumer culture as part of 'everyday life'. But in the unfamiliar apocalyptic space-time of *The Road*, this everyday vision of America has become fragmented and disorientating.

In reading the eponymous road of McCarthy's text we can therefore identify a re-writing of the chronotope of the American road novel. This re-writing emphasises the vestigial and fragmentary markers of space and time in a world after the end of human history. In so doing it

disrupts the anthropocentric enframing of space and time that would otherwise structure the man and boy's journey. Appropriately for this disruption of such structuring, the road itself 'ends' symbolically at the formless and shifting mass of the ocean. Here, the man and boy encounter an abandoned boat that has been washed up on the shore having evidently floated aimlessly on the sea for many years. Inside the boat, the man finds and discards a now useless sextant,[54] a device that represents the anthropocentric projection of form onto the otherwise formless ocean through navigational systems. The discarding of this sextant symbolises the man's abandonment of western knowledge and specifically its enframing of nature through cartography, which the boat itself reminds us was once critical to the navigation and exploitation of the ocean. Like the 'drowning' of the world in Ballard's text, water here signals the final failure of a human history of attempting to enframe nature through cartography.

The Road's specific figuring of the ocean as formless also recalls earlier representations of the sea by authors such as Herman Melville and Joseph Conrad, for whom the sea was 'something unfathomable and limitless': a vision of the sublime beyond the full understanding and complete mapping of western civilisation even up to the end of the nineteenth century.[55] Significantly, the incident with the sextant recalls the passage in Melville's *Moby Dick* in which Ahab discards his 'quadrant', a precursor to the sextant, and declares 'no longer will I guide my earthly way by thee'.[56] Ahab's action arises from his own personal psychosis as he pursues the 'white whale', and is symbolic of his rejection of the objectivity of post-enlightenment thought: of attempts to map the ocean in 'Cartesian Space' as one commentator has put it.[57] Both Ahab and the man encounter the technological enframing of nature through cartography, and both discard it along the journey. In the case of the man, the rejection of the sextant also echoes Kerans' abandonment of his cartographic and taxonomic mission in *The Drowned World*, which also heralded the end of anthropocentric practices as we saw in Chapter 1. As with Kerans, the man is responding to a new reality of a world in which the knowledge and accurate mapping of the oceans that took place in the twentieth century is lost, and where spatial coordinates and Cartesian navigation have become obsolete. If the spatial destination of the road is this nameless ocean, then like Kerans' 'paradises of the reborn sun'[58] this literary space also registers a sense of a temporal destination beyond anthropocentric enframing. This destination is nothing less than the 'formless' age to come[59] that the narrative evokes.

The Geologic History of *The Road*

Significantly, the idea of a 'formless' age to come – registered by the boy's flute music and the presence of the nameless ocean at the end of the road – is suggestive of a continuation of a complex nature beyond both the human history of industrial modernity and the *biological* history

of the biosphere. This non-biological future is also registered in the novel's apocalyptic representation of the space-time of the road itself. In contrast to the dead husks of trees and bushes and other vegetation that litter the landscape of the novel,[60] the road is non-organic and has never been biological. Consequently it appears largely unaffected by the transformed environmental conditions described elsewhere in the novel. This contrast is particularly apparent in a discussion between the man and boy concerning an 'oilcompany [*sic*] roadmap' which they use to navigate the road:

> These are our roads, the black lines on the map. The state roads
> Why are they the state roads?
> Because they used to belong to the states. What used to be called the states.
> But there's not any more states?
> No.
> […]
> But the roads are still there.
> Yes. For a while.
> How long a while?
> I don't know. Maybe quite a while. There's nothing to uproot them so they should be okay for a while.
> But there wont [*sic*] be any cars or trucks on them.
> No.[61]

The man's references to the 'states' that the road supported reminds us that the road itself is an anthropogenic structure built for the benefit of industry, commerce, and consumption. It is a physical monument to the social and economic fabric that it once supported but which has now vanished; a vestigial relic of the anthropogenic spatial structuring of the landscape that maps out the shape of the vanished states. But the boy's questions about what will happen to the road in the future registers a sense of this anthropogenic structure that is also temporal. The materiality of the road will persist for a long time chronologically because there is no biological life to 'uproot' it. The man's choice of the word 'uproot' is significant because of the biological imagery the word evokes; it is a word that we might more normally associate with plants or more specifically trees that are uprooted by the weather or by human actions. The man seems to imply an inversion of this sense of uprooting: it is the road that has 'roots' in industrial modernity, and there are no living trees to undermine its physical structure. Its 'roots' can be understood as both anthropogenic and geological in terms of the industrial processing of naturally-occurring

materials, yet its physical structure survives the particular conditions brought about by the apocalypse.

In contrast to the endings of biological nature and the human structuring of the world through language that I have highlighted already, the future of the road after the apocalypse that is suggested by the man's responses to the boy's questions is therefore unexpectedly long-term. The road will not only outlive the human species that created it, but also persist in the transformed environment that has made that species' life impossible. This sense of futurity points to a future history which the man can only map in general terms, just as his fragmented and large scale map can only render the road in general spatial terms. There is therefore a parallel between the man's fragmentary historical consciousness and the fragmentary spatial awareness relayed by the map. This parallel suggests that the traditional chronotopic function of the road is itself fragmentary, even though it also structures the man and boy's journey over time.

However, I would also suggest that the boy's questions about the future of the road point towards a further rethinking of the road as a chronotope. Etienne Turpin has recently suggested that the Anthropocene itself should be regarded as a chronotope, one that relates the anthropogenic transformation of planetary spaces to the transformation of geologic history.[62] Indeed, if Chakrabarty's account of the Anthropocene emphasises the need to situate the recent human history of modernity within a longer geologic history, then this emphasis appears to relate such history to the earlier calls of environmentalists to 'think globally', or in other words situate ourselves in global space. A key implication of Chakrabarty's account of geologic agency is that anthropogenic climate change takes place across space (the biosphere) as well as time (geologic history). Chronotopic allusions to this relationship therefore seem apposite and germane to literary narratives of the Anthropocene.

The boy's questions and the man's answers about the futurity of the road suggest a temporal dimension to the road in addition to the spatial dimensions through which it traces the anthropogenic shapes of the former states on the map. In particular, the 'quite a while' that the man refers to contrasts with the imminent end of human life that has already rendered those states obsolete, and suggests that the road will continue to exist over the *longue durée* of geologic history. The road's spatial marking of the landscape is therefore also related to a similarly anthropogenic temporal marking of history, and crucially of a geologic history that extends beyond the species life of humanity. This anthropogenic marking of both space and time beyond human history is emphasised by the man and boy's traumatic account of human victims of the apocalypse, who have been fused into the road itself by some tremendous heat associated with the cataclysm. These 'figures half mired in the blacktop' were 'trying to get away' but are now 'mummied figures' that will struggle 'forever in the road's cold coagulate'. [63] This striking imagery of human remains trapped in the structure of the road recalls the extinct Pleistocene megafauna

that are most often associated with having become 'mired' in tar pits. Like these remnants of a previous geologic era, the victims the man and boy encounter have been solidified in the act of their journeys so that they appear frozen in space and time and thus preserved. These grotesque 'mummied figures' can therefore be understood as biological remnants of the human species held in the Anthropocene structure of the road in an image that conveys a consciousness of geologic history. Both Anthropocene and Pleistocene megafauna are now part of a geologic record of the past, preserved for the future by the roads and tar pits that marked their particular environmental contexts. The road of course is itself a form of tar, as the text intimates elsewhere when the man observes the remains of a cannibal camp 'stuck in the melted tar' of its surface.[64] In this way the novel's organising chronotope associates an image of geologic history with the human history of modernity. This association illuminates how the anthropogenic transformation of space is inextricably entwined with the anthropogenic transformation of time in the chronotope of the road.

By imagining the road as a chronotope that relates geologic timescales and anthropogenic spaces, the text draws upon a science fictional motif that we identified in the imagery of strata in the city in Ballard's *The Drowned World*, and which is also evident in the excavation of buried cars in his later novel *The Drought* (1965). These geologic motifs shared a chronotopic function of connecting the spaces of the city and the modernity it symbolises with the temporality of geologic history. By re-reading Ballard's fiction after the Anthropocene, I suggested that these motifs disrupted the anthropocentric separation of human and geologic history by re-imagining modernity as a strata of geologic history. The road of McCarthy's novel also marks an important disruption of anthropocentric narratives of human history. Such narratives are shown to be limited in duration, and stratified within geologic history in the same way that the preserved remains of extinct Pleistocene megafauna stratify earlier species in this history. In this way, the paleontological stratification of preserved human remains in the anthropogenic asphalt of the road offers a striking chronotopic image of the Anthropocene that undermines the anthropocentric boundary between human history and geologic history.

The Trauma of an Ending: Registering the End of History as *Avenir*

This disruption of the anthropocentric boundary between human and geologic history also necessarily disrupts the coherence of human history that Kermode's account of the modern apocalypse seeks to reproduce. Indeed, the very notion of human history as a discrete category of analysis that somehow also resists an ending, which is implied by the modern apocalypse, appears absurd from the perspective of the man and boy. Their survival beyond the historical moment of the cataclysm places them at the beginning of a post-Anthropocene era of geologic history in

which human history has passed into the geologic record.[65] It is from this perspective that they experience the fallacy of the 'modern apocalypse' – and the anthropocentric conception of an eternal history that it maintains – in the traumatic experience of an ending that has already passed.

This fallacy is underlined by the fragmentary account of the apocalypse itself. For the man and boy the apocalypse is never experienced as part of a current 'moment'; it is rather referred to obliquely in the man's flashbacks, and these are the only reference to the apocalypse itself and its aftermath that the narrative provides. These disturbing episodes are generally very brief and lacking in detail, and appear in the text without warning. The man's flashback to the event itself is a key example. It begins immediately after the man wakes from a dream and, uniquely in the novel, contains what appears to be a definitive marking of time:

> The clocks stopped at 1:17. A long shear of light and then a series of low concussions. He got up and went to the window. What is it? She said. He didnt [*sic*] answer. He went into the bathroom and threw the lightswitch but the power was already gone.[66]

This reference to the precise time of the disaster calls attention to the significance of the event, promising the detailing of a singular apocalyptic moment in time that the reader has been waiting for. This promise is emphasised by the man's wife, who asks the question 'What is it?'; this might also be our question as readers. But this promise of revelation is not fulfilled. Light and sound follow the moment, but these are impressions related by the man that provide no definitive answer to his wife's question. The time of '1:17' meanwhile appears to represent nothing beyond an arbitrary marking of time that is already obsolete because the 'clocks' have stopped. The use of the plural form here is crucial: the implication is that all clocks have stopped and that the clock time of modernity has also stopped. This stopping of the clocks effectively registers a sense of the end of human history, which we delineate through the measurement of time. Such measurement is now without meaning.

Graulund has suggested that the man's flashbacks do not preclude the possibility of a series of events that cause the novel's apocalypse.[67] However, the stopping of the clocks does register a singular end of human history as delineated by the technological enframing of time. In contrast to the clock's specificity, in the present of the man's journey down the road with the boy there is no systematic marking of time. Instead, the narrative tells us that the man 'hardly knew the month'.[68] Whatever may have occurred before or after the clocks stopped to contribute to the apocalypse, the stopping itself is the critical moment of apocalypse.

However, even though it registers this apocalyptic moment, the novel withholds any causal

explanation of the apocalypse. This lack of definitive detail is repeated throughout the flashbacks that the man experiences. For instance, in a later flashback passage, the narrator appears to relate the morning after the clocks stopped to an image of victims of the event, who are 'half immolate and smoking in their clothes' by the roadside.[69] Like the man and boy's encounter with the human bodies melted into the road years later, this image is suggestive of tremendous heat. But it provides no explanation for the cause of that heat. Again, the man provides only fragmented impressions of the apocalypse rather than reasons for it. Given his function as the narrative focaliser of these flashbacks, and his position in the narrative as a survivor of the apocalypse, we might expect his recollections to provide a more coherent and authoritative account of the apocalypse. Indeed, Petter Skult has suggested that the survivors of apocalypse in fiction can normally be regarded as authoritative in ways reminiscent of real-life survivors of traumatic events because they know what we do not know. For Skult, the man in *The Road* is a particularly good example of this parallel. But Skult goes on to describe another parallel with real-life survivors, namely that of the traumatic witness who is 'obliged to re-live and re-experience their pasts'.[70] The partial and fragmented nature of the man's flashbacks, and their tendency to occur randomly in the text, is suggestive of this particular figure of the traumatic survivor.

Read as the flashbacks of a traumatic survivor, the lack of details regarding the precise etiology of the apocalypse can be seen to register the immediacy of the disaster in a particularly profound way. The man appears unable to directly think about the event, and instead jumps back and forth through his memories to his childhood, the early days of his marriage, and the first few years after the apocalypse. This technique of shifting back and forth through his personal experience of time echoes other literary representations of traumatised characters, such as Billy Pilgrim in Kurt Vonnegut's *Slaughterhouse 5* (1969). Vonnegut explicitly figures Billy as 'unstuck in time';[71] a science fictional narrative conceit that establishes the text's movement back and forth around the central cataclysm of the novel, which is the fire-bombing of Dresden in 1945. Like the event in *The Road*, the fire bombing itself is not directly described, although its cause is widely known.

Skult also relates the figure of the traumatic survivor to Cathy Caruth's theory of trauma, in which she draws on psychoanalytic perspectives on the repression of trauma to suggest that 'traumatic experience, in its very immediacy, involves a delay'.[72] In thinking about the particular experience of the man in *The Road*, this delay is registered in the text through what Caruth describes as the 'repetition of the earlier',[73] which we can relate to the man's flashbacks. Because these are presented in the text in a fragmented and incomplete manner, the act of repetition is also one of delay. Like the fragmented spatial account of the man's map, which is 'sorted into leaves and numbered with crayons in the corners for their assembly', [74] the man's account of history consists of disconnected memories that he re-arranges during the course of the novel. But

he never achieves any coherent historical consciousness through this act; no authoritative account of the event is ever relayed.

This analysis of the man's account of history suggests a difficulty in depicting the apocalyptic event itself that is born of psychological trauma. But the presence of this trauma in the text is related in several ways. There is the trauma of the event itself and its immediate consequences, the trauma of the suicide of the man's wife, and the pervasive trauma of the man and boy's journey through a world at once recognisable and alien. The transformation of this world in contrast to the world before the event is an important part of this trauma, but one which the man also avoids articulating directly. When for example he and the boy encounter the house where the man grew up, their arrival is without explanation or ceremony:

> The day following some few miles south of the city at a bend in the road and half lost in the dead brambles they came upon an old frame house with chimneys and gables and a stone wall. The man stopped. Then he pushed the cart up the drive.[75]

The man almost seems ready to pass by the house, as he has so many other houses. It is not clear if necessity has brought them to this particular place or if the man has led them there deliberately. But the desire to revisit a familiar place, 'all much as he'd remembered it', [76] is rendered as a form of flashback by the contrast between the decay of the house evident to the boy and the man's fixation on memories of his childhood, which are described as 'shapes claiming him'[77] that the boy cannot see. This waking flashback ends abruptly when the man opens a closet door in his old room 'half expecting to find his childhood things. Raw cold daylight fell through from the roof. Gray as his heart'.[78] This ending of the illusion of the 'shapes' of the man's flashback suggests the breaking of a spell. It is as if the man was viewing the familiar house through an augmentation of memory that is suddenly shattered by the empty closet and the daylight falling through the hole in the roof. This is a particular kind of apocalyptic trauma that is distinct from either the visceral horror of witnessing the spectacle of tar-mired corpses or the emotional loss of his wife by suicide. The sudden re-assertion of the transformation of the house, which breaks through the augmented reality of the man's flashback, conveys a sense of the apocalyptic world as an alien time that transforms a familiar world into an unfamiliar one. Skult has suggested that the encounter with the man's childhood home is reminiscent of the 'psychoanalytic concept of the *unheimlich*, or the uncanny',[79] in which the pre-event and post-event realities collide in a manner comparable to science fictional representations of time travel. I would suggest that more than simply registering a sense of the uncanny, this living flashback frames the man's trauma in terms of a disorientation of place and time that he is unable to reconcile. The 'uncanny' that Skult refers

to can then be understood as a sense of being lost in a transformed world containing recognisable features of an imaginary past that has traumatically 'ended'.

The man's traumatic flashbacks are therefore not so much about repressing memory as a continuing attempt to re-construct a world that has been transformed by an event that is only knowable through memory. The immediacy of the event itself meant that the man's experience of it is only ever related in retrospect; an experience which is foregrounded by the particular flashback describing the stopping of the clocks. The clocks stop as an *effect* of the apocalyptic moment, which is not itself represented. The sentence which follows the man's recollection of the stopping of the clocks reads: 'A long shear of light and then a series of low concussions'. [80] This sentence may seem to describe the event itself, but it is subordinated to the previous sentence. The ordering of these sentences underlines the extent to which even the light and sound of the event are echoes of the event delayed by distance. The moment itself remains shrouded in the man's history, an event that he could only possibly piece together afterwards.

But it is this piecing together that is impossible for the man. The apocalypse has occurred, but because the man is unable to provide a coherent account of the mechanism or cause of the apocalypse – and because the text's account of the past is almost entirely focalised through the man's flashbacks – the registering of a coherent apocalyptic 'announcement' never takes place. It is this 'announcement' that for Derrida marked the predictive apocalyptic mode of *futur*, and the absence of such an announcement underlines the significance of the man's trauma for how the text registers the end of human history. In resisting a coherent historical announcement, the man's fragmentary account of the event effectively forestalls the anthropocentric ordering of history that tends to maintain an artificial separation between human and geologic histories. But it is through his traumatic experience of this historically fragmented apocalypse that the man encounters the real conditions of his relationship with the biosphere; it is the fragmentation of historical consciousness that marks a breaking down of the Lacanian symbolic order as he moves towards the 'formless'[81] future. In this sense, the apocalyptic world of *The Road* suggests a disruption of the anthropocentric foundations of ideology that I previously suggested are reproduced in Kermode's 'modern apocalypse' as a means of naturalising an eternal view of human history.

By contrast with both Kermode's modern apocalypse and Derrida's own *futur*, the novel's apocalyptic mode therefore seems to be most readily understandable in terms of the unknowable Derridean *avenir*; it is the disorientating apocalypse of *avenir* that is evoked by the man's flashbacks. This disorientation disrupts any possibility of the historical coherence that Kermode attributes to the modern apocalypse because the man's flashbacks offer no coherent announcement of the end with which to make sense of the present moment. Instead, the end is registered through the man's experience of a future beyond human history and the possibility of historical consciousness, in which the end of this history resists coherent causal explanations.

Indeed, Derrida's concept of *avenir* provides a particularly helpful way of thinking about the apocalypse of *The Road* in light of the more recent idea of the Anthropocene, because the crisis of anthropogenic climate change that marks this era cannot be readily understood in terms of its announcement. In contrast to the imminent destruction of an all-out nuclear exchange, which as Derrida reminds us was 'declared' but did not happen, the historical experience of anthropogenic climate change is 'immanent' in a way that complicates its own announcement. It is already occurring and has been occurring for many years before it was 'announced' by scientists. We shall see in subsequent chapters that the terms of that announcement in and through scientific discourse are subject to the same ideological processes that seek to obscure geologic agency and render nature as infinitely exploitable. But even if we accept that the emergence of a consciousness of anthropogenic climate change constitutes a form of 'announcement', this announcement is a fragmentary and often disorientating attempt to re-interpret the world and understand human species life in relation to the biosphere. If we read McCarthy's novel in this context, then the man's traumatic and partial sense of an ending registers a particular sense of the uncanny that is reminiscent of the disorientating experience of thinking about the biosphere after the Anthropocene; an experience in which the anthropocentric view of human history is challenged by a new view of a world in which the reader must reconsider their own sense of human history in relation to their condition as a biological organism and their participation in geologic history. In a sense, we must begin to consider consciousness of the Anthropocene itself to be a form of *avenir*: an apocalypse that appears unannounced but which renders our view of the world irreconcilably changed.

Without Biosphere: Embodying The Disconnection from Nature

In reading the apocalypse of *The Road* as *avenir* – and suggesting that the disorientating experience of thinking about the Anthropocene as an immanent apocalypse is itself a form of *avenir* – we can begin to understand how the novel's mobilisation of apocalypse serves a speculative function that encourages readers to think through and beyond the implications of the change in perspective that anthropogenic climate change demands. This speculative function is particularly apparent in the ways that the text's apocalyptic narrative defamiliarises the relationship between the novel's human characters and their environment. Such defamiliarisation is signalled through the novel's over-arching image of an apocalyptic disconnection from nature, an image to which critical responses to the novel draw attention. Examples include Louise Squire's analysis of the novel's depiction of the 'loss of the world',[82] and Monbiot's description of a 'world without a biosphere'. This sense of being disconnected from nature is relayed to the reader in particularly vivid fashion through the use of allusion in describing loss of sunlight: 'By day the

banished sun circles the earth like a grieving mother with a lamp'.[83] The image of the Sun as 'mother' to the Earth is a simile for natural and environmental processes that emphasises how the Sun gives forth to and nurtures life on Earth. If the Earth, along with all planets in the solar system, was formed from materials in the solar nebula left over from the Sun's creation, then the Earth is metaphorically a 'child' of the Sun. More specifically, however, almost all life on Earth is dependent on the Sun through the energy cycle that begins with photosynthesis. In this sense, the Sun gives and sustains life, making the sun 'mother' to all life including humans. The maternal language here avoids enframing this relationship though the technological horizon of scientific descriptions that would tend to figure the relationship in exploitative terms. Instead, this is a language of nurturing that emphasises humanity's dependence upon nature. It is the estrangement from nature that signals humanity's new condition of existing in the absence of the biosphere on which it has historically depended for its survival.

In this way, the 'banishment' of the Sun also provides a powerful image of a dysfunctional relationship between humans and nature within the novel's apocalyptic world. With no Sun there is no planetary biological system to enframe or exploit. Although 'nature' remains present, it is rendered only in geological terms: through the landscape of hills and valleys that the man and boy traverse to the ocean and beach where their journey ends; through the earthquake they feel one night;[84] and through the non-biological futurity that the road itself signifies. In the absence of the biosphere, the human survivors are literally, rather than figuratively in Ruth Irwin's words, 'walled-off'[85] from nature.

The novel conveys the implications of humanity being literally 'walled-off' from nature in this way through an apocalyptic allegory of a hunter-gatherer society. This allegory works through the text's representation of two kinds of survivor, each of which evoke a sense of the 'hunter' and the 'gatherer' respectively. The novel signals the distinction between these two kinds of survivor via the man's memories of the early years after the cataclysm:

> The world soon to be largely populated by men who would eat your children in front of your eyes and the cities themselves held by cores of blackened looters who tunnelled among the ruins and crawled from the rubble white of tooth and eye carrying charred and anonymous tins of food in nylon nets like shoppers in the commissaries of hell.[86]

This passage anticipates the two modes of existence encountered by the man and boy: the cannibalistic hunter and the scavenging gatherer. The cannibals eat 'children', essentially cutting-off the continuation of the human species. Meanwhile the looters are compared to 'shoppers': a comparison that could be read as an ironic parody of the consumerist exploitation of nature. The

figures of hunter and gatherer do not therefore represent an actual return to an earlier condition of exploiting the biosphere as biological agents. Rather – as we shall now see – they mobilise the grotesque in order to defamiliarise the anthropocentric enframing of nature as a resource.

The Apocalyptic Gatherer

The apocalyptic gatherers are survivors who live through 'gathering' the remains of the vanished civilisation of industrial modernity, and are exemplified by the man and boy's reliance upon found remnants of industrial products from a historical moment prior to the apocalypse. They rely on lucky finds of industrially-produced resources such as oil, gasoline and tarpaulins for heat and shelter. More important in distinguishing their condition as gatherers however is their reliance on preserved foodstuffs. In the years since the disaster occurred, the availability of these artificially preserved resources has diminished as it is consumed without any means of being replaced. The majority of places the man and boy visit have been looted long previously, so that the man sometimes has to take chances with foodstuffs others have previously ignored as too risky.[87] This re-appraisal of resources previously considered too risky highlights the reality of a finite and dwindling stock of food resources that will sooner or later run out.

When the man discovers a cache of food in an undisturbed nuclear fallout shelter, he describes, 'Chile, corn, stew, soup, spaghetti sauce. The richness of a vanished world'.[88] This vanished 'richness' encompasses both the economic and biological 'richness' of the pre-disaster world. The man and boy are effectively cheating death by using food energy exploited industrially from the biosphere when it existed and held in stasis beyond the end of that biosphere by human technology. The tinned food is thus rendered ironically as a specific form of fossil fuel: the anthropogenically stored and transformed energy left over from now extinct biological processes. This practice of foraging for the left over resources of the disappeared world frames the man and boy as a form of life that subsists on 'borrowed time and a borrowed world'.[89] Such a sense of borrowed time also comments on the unsustainability of living off the technologically enframed exploitation of the biosphere.

Divorced in this way from the sustaining interconnectedness of a functioning biosphere, humanity begins to embody the very anthropocentric distancing from nature that Heidegger identified with the technological horizon. The man and boy's unsustainable reliance upon the technological exploitation of nature in their 'borrowed time' provides an incisive image of the final outcome of such distancing. The unsustainable reality of being divorced from nature in this way is signalled by the man's concern for the 'world shrinking down […] drawing down like something trying to preserve heat. In time to wink out forever'.[90] This quote concludes the man's rumination on the disappearance of 'parsible entities' discussed earlier. The parallel with an attempt to

'preserve heat' suggests a futile attempt to retain useful energy in a context where no new energy is available, which in turn suggests an entropy that undermines the enframing of nature as an infinite resource. The 'winking out' then grounds the novel's sense of an absolute ending in which a humanity utterly divorced from natural processes and reliant only on the remnants of its exploitation of the biosphere finally runs out of resources completely and forever. The lack of sustainability implicit in the exploitation of these resources emphasises a complete failure of the technological processes of mass food production and preservation to continue supplying produce, and clearly highlights the reliance of even the most abstract and packaged of modern food substances on the ultimate support of the biosphere. The figure of the apocalyptic gatherer in *The Road* can thus be seen to embody a particular disconnection from nature that serves to foreground the condition of humans as biologic agents. In doing so, this figure invites readers to think through both their dependency upon the biosphere, and the finitude of its resources.

The Apocalyptic Hunter

However, perhaps a more fundamental figuration of this disconnection from nature – and its implications – is present in the text's representation of what I will call the apocalyptic hunter. This figure is exemplified in the text through its depictions of cannibals, who capture and eat other survivors.[91] These cannibals represent a humanity stripped of technoscience and the politically constituted life of modernity. To survive they instead consume the physical bodies of their own species as a resource, which is again suggestive of entropy. The novel's image of a roasted baby,[92] along with the attendant suggestion that women are becoming pregnant as a means of producing food rather than a new generation, is particularly acute and stark in this regard. In the world of *The Road,* processes that once supported the sustainability and inter-generational survival of human societies, such as procreation, have become a means of sustaining one group of individuals, through the consumption of a dwindling number of other individuals.

This particular figure of the cannibal can be traced to one of several identified by Cătălin Avramescu, specifically the cannibal as 'a product of particular circumstances…[of]…extreme hunger'. [93] This is cannibalism as a means of survival, a form distinct from the cultural practices discussed by Avramescu because it specifically frames human beings as a resource. We can recognise this framing in *The Road* in the man and boy's encounter with a small group of cannibals who capture travellers on the road and keep them in a basement to be consumed slowly, a limb at a time.[94] These humans are eaten because they represent the only living element of the biosphere that remains to be exploited. They are the last 'resource' to be exploited, and the cannibals 'hunt' these victims in a dark parody of the earliest forms of human survival. This parody of the figure of the hunter, who now hunts human victims, recalls the 'scalp hunter' Glanton gang of McCarthy's

earlier *Blood Meridian* (1985), a gang that hunts down and murders victims to claim their scalps in the nineteenth-century American West. The repetition of this historic consumption of humans, albeit for food rather than money, suggests a repetition of the enframing of humans as a resource. It was of course just such an enframing that was subject to satirical critique in Jonathan Swift's references to cannibalism in his famous 1729 essay *A Modest Proposal*.[95]

However, even the figure of the cannibal as a 'product of particular circumstances' is inadequate to account for the cannibalism depicted in *The Road*. The cannibals survive by eating people, but the man promises the boy that they would never eat anyone even if they were starving, 'no matter what', because they are the 'good guys'.[96] This suggests a moral choice that is different to that implicit in Avramescu's examples of shipwreck survivors, whose choice was between life and death. The choice in *The Road* is between death and death; cannibalism merely delays this death. I would therefore like to suggest that the figure of the cannibal in *The Road* is specific to the particular apocalyptic setting, and does not lend itself to more traditional understandings of this figure. This cannibal should be understood in the context of the end of the biosphere; their exploitation of humans as the last remaining resource of the 'world without a biosphere' works to disrupt the reader's recognition of the world of *The Road* and registers the experience of the unfamiliar in the transformation of the familiar. This defamiliarisation is precisely what Skult refers to as the 'uncanny': the 'feeling of re-recognizing something that no longer fits with the image of what this something should look like'.[97] The 'should' that this thing should look like is the imagined relationship between humans and the biosphere. It is in these encounters with the uncanny that *The Road* performs a speculative function that sheds a particular light upon understandings of anthropogenic climate change. By inviting us to view the complex interdependencies between humans and the biosphere in a way that seems unfamiliar – and which posits the question of what an actual disconnection from nature would entail – the text encourages readers to recognise and rethink their own anthropocentric assumptions. It is precisely this kind of re-thinking that the consciousness of the Anthropocene demands.

The Fragments of Anthropocentrism: Repetition, Ritual, and the Possibility of Salvation

So far we have seen how dominant anthropocentric accounts of the 'modern apocalypse' are inadequate as a way of understanding anthropogenic climate change. We have also seen how a close reading of *The Road* suggests a more radical form of apocalypse; one that registers a sense of what Derrida calls *avenir*, and which conveys the post-human existence of nature through the gradual disappearance of human language and understandings of the world. I have identified how

the disruptive space-time of the novel's own structuring chronotope – the road itself – and the man's traumatic and fragmentary account of the cause of the apocalypse and its aftermath, serve to relay this sense of *avenir* to the reader. Finally, I have suggested that the text performs a speculative function that imaginatively embodies the anthropocentric separation of humans from nature, and in so doing helps readers to think through the unfamiliar view of the world that is revealed by their immanent consciousness of the Anthropocene. This view casts an urgent and profound light upon understandings of anthropogenic climate change.

Indeed, in offering this unfamiliar view of the world through the defamiliarising experience of *avenir*, the novel intrudes upon the dominant and anthropocentric way of thinking about the biosphere that we saw was disrupted in Ballard's *The Drowned World* and *Hello America*. In so doing, McCarthy's more recent text helps readers to think through those questions of humanity's biological dependences on the biosphere that are brought into focus around the Anthropocene. But the novel also reveals the extent to which the ideological processes by which human subjects are ordinarily encouraged not to think in this way persist, even in the face of such an apocalypse. As we saw in the previous chapter, the repetition of anthropocentric habits of thought – such as those identified in the historical narratives of Wayne's American dreams – is an important strategy for the reproduction of ideology through which the real conditions of biologic and geologic agency are obscured. In the world of *The Road* there does not at first appear to be any overt role for ideology in the strictly Althusserian sense because the state and the capitalist system that it would serve to maintain no longer exist. Yet despite this absence of civil society, the text implies that a residual set of anthropocentric beliefs and values do survive, at least for the man and boy. It is through the repetition of these beliefs and values, in particular through the use of ritualised practices and the reiteration of certain key phrases, that they maintain their distinction from the cannibals and attest to their own status as 'good guys'.

The importance of repeating rituals and key phrases is evident in the man's attempts to re-create a form of ideological practice in response to the traumatic experience of *avenir*. One example of this practice is the ritual that the man self-consciously creates when faced with washing the brains of a cannibal out of the boy's hair. The man likens this startling act to 'some ancient anointing. So be it. Evoke the forms. When you've nothing else construct ceremonies out of the air and breathe upon them'.[98] In the face of the total collapse of society, the man appears to resist the barbarism of the cannibals by constructing a ritualistic ceremony. This ceremony allows him to evoke the 'forms' of ritual practice, to construct a cultural practice that allows him to perform this act without losing his sense of himself as one of the 'good guys'. Although the man and the boy are at the point of starvation, they will not resort to cannibalism. Instead, through this ritual they figuratively and literally wash themselves clean of the cannibal's death, and of the possibility of becoming cannibals themselves. This ritual clearly serves a psychological purpose, in

that it helps the man to cleanse himself of the horror of the situation. But it also contains a socially-constitutive dimension in that the defeat and washing away of cannibalism reinforces the man's role as a parent in caring for his son, and their shared belief in being the 'good guys'.

As Judith Butler notes in her discussion of Althusser's account of ideology, the individual's embodiment of the rules of ideology is linked to the reproduction of those rules in ritual.[99] Ritual is therefore one of the acts of repetition through which ideology is maintained. Moreover, the ritual itself can be 'senseless' in that its performance, like that of the man's construction of ceremony, may lack intrinsic meaning. The act of ritual itself brings that meaning into being when the subject undertakes ritual, so that, as Butler observes with reference to Wittgenstein, we need not 'first believe before we kneel'.[100] This concept of senseless ritual illuminates the man's arbitrary creation of ritualistic forms because it is not the form itself that matters so much as the expectation that 'sense will arrive in and through'[101] it. At the same time, his expectation is marked by the religious connotations of these forms; his rituals carry a residual awareness of religious practices of 'anointing'.

In light of Butler's account of the performative function of ritual in ideology, the man's act of creating a 'ceremony' can be read as a repetition of the practice of ritual in order to create and maintain his status as one of the 'good guys'. This repetition appears as a self-conscious attempt by the man to re-assert a pre-apocalyptic way of thinking, through which he seeks to resist his own fragmentary consciousness, and in doing so also resist or perhaps even obscure the reality of his condition. In this condition, the choice between being a 'good guy' and being a 'cannibal' has no meaningful relation to survival because imminent death haunts either option; the choice is meaningless within the terms of the world of the road itself. The man's claim to maintain the values of being 'good guys' therefore appears as an attempt to retain something of the moral co-ordinates of the pre-disaster world that he remembers. This is the world that is related through flashbacks of childhood sailing trips with his uncle and the 'shapes' he perceived when visiting his childhood home. Like these flashbacks, and the traces of the former world that the man and boy encounter on the road, the man's repetition of ritual begins to appear as an ideological remnant of the world that has vanished; a response of sorts to the disorientating experience of *avenir*. I would like to suggest that this remnant is reproduced by the man and boy in what they call 'carrying the fire'.

Carrying the Fire and the Remnants of Ideology

For the man and boy, 'carrying the fire' indicates the maintaining of what it means to be one of the 'good guys':

> We wouldnt [*sic*] ever eat anybody, would we?

> No. Of course not.
> Even if we were starving?
> […]
> No. No matter what.
> Because we're the good guys.
> Yes.
> And we're carrying the fire.
> And we're carrying the fire. Yes.
> Okay.[102]

Both the man and boy's repetition of the phrase 'carrying the fire' appear crucial to their shared sense of themselves and each other as the 'good guys'. The word 'fire' is important here, because fire needs to be tended in order to maintain it. This tending of a fire suggests a repetition of practice that is reflected in the repetition of the phrase itself. The boy's statement demands the man's repeated reply, a repetition that again recalls a religious ritual, in particular the 'call and response' form of ceremonial prayer. Meanwhile, the word 'carrying' recalls the practice of transporting fire between larger fires. 'Carrying' fire, for example, by making use of the slow-burning properties of bracket fungus, is an ancient technique for transporting it from one location to another so that it is continuously maintained.[103] The origins of this practice are practical, but it has also developed into religious and secular ceremonial practices: for example, the carrying of the modern Olympic flame from Olympia in Greece represents continuity with the ancient Greek games. The 'fire' that the man and boy carry is the man's account of the idea of being a 'good guy', which is a fragment of the moral 'fire' of a civil society that has vanished. For the man 'carrying the fire' therefore conveys a sense of maintaining the very idea of being the 'good guys' that is itself a fragment of the man's own memory of human morality prior to the apocalypse. Although the society itself no longer exists, he continues to carry ideas that were dominant within that society and through the repetition of 'carrying the fire' seeks to pass these ideas on to his son.

The man and boy's repetitions of 'carrying the fire' can therefore be understood as attempts to reconstruct and maintain – from the fragment of this 'fire' – some of the moral ideas that maintained society before the apocalyptic event, and through which moral sense could be made of the world. But this moral framework for making sense of the world carries other implications. The symbolism of 'carrying the fire' is also an intertextual allusion to pre-Judaeo-Christian myth in which fire is a symbol for human knowledge more generally, which was given to humanity by Prometheus in Greek mythology. In this context, fire is a means of asserting power over nature, and therefore implies a technological enframing of that nature that gestures towards the origins of the technological horizon through which humanity became 'walled-off' from nature.

Indeed, even in its most basic sense, the controlling or 'carrying' of 'fire' enframes nature as an exploitable resource, without which the recent human history of modernity and its ancient origins in early organised societies would not have been possible. It is after all knowledge of fire that both reveals aspects of nature and allows that nature to be exploited. The significance of this Promethean mythology of fire must also be understood in light of its repetition in the popular imagination by subsequent literary and filmic references that range from early examples such as Mary Shelley's *Frankenstein; or, the Modern Prometheus* (1818)[104] to Ridley Scott's *Prometheus* (2012).[105] These references draw more specifically upon the myth's implications for thinking about relations between nature and the human individuals and societies that seek to exploit it, and the technology that enables such exploitation.

Neither the man nor the boy consciously relate their notion of the 'fire' that they 'carry' to these technoscientific implications, although the man does at one point reassure the boy that 'carrying the fire' will protect them from harm.[106] Nevertheless, the novel's allusions to the biblical *Genesis* do suggest that the moral 'fire' through which the man and boy preserve the ideas of the vanished society does also encompass the anthropocentric enframing of nature as a resource. Indeed, both the moral and anthropocentric readings of the symbolism of 'carrying the fire' are brought together in *Genesis* by the association between the emergence of morality in the 'fall' and the attendant acquisition of knowledge gained by eating the forbidden fruit; it is only after eating the fruit from the tree of knowledge that humanity is capable of moral thinking and capable of becoming geologic agents. Thus the condition of post-lapsarian humans is inscribed in the biblical tradition in terms of a human capacity both for morality *and* knowledge. We can therefore interpret the man and boy's repetition of 'carrying the fire' as a repetition of a specifically biblical sense of humans as separate from the rest of biological nature because of their moral and technological knowledge. In this sense, 'carrying the fire' is not merely a repetition of faith in a moral code, but also re-inscribes the basic anthropocentric separation of the human subject from the biosphere through which – as we have seen – the human exploitation of that biosphere is ultimately naturalised.

But there is a paradox here. If *Genesis* mythologises the separation of humans from nature in terms of both the origins of human morality and the acquisition of knowledge that precedes geologic agency, then the man and boy's faith in 'carrying the fire' as a means of retaining a moral code is also a faith in the promise of an anthropocentric relationship with the world. It is by seeking to maintain this relationship that they resist the apocalyptic absence of society and avoid resorting to cannibalism. But in doing so they might also seem to be preserving an imaginary relationship with the biosphere that obscures the real conditions of their existence in a world that appears to lack any possibility of ultimate salvation. As the man's wife says to him in a flashback shortly before her own suicide: 'You talk about taking a stand but there is no stand

to take'.[107] It is in this 'stand' of 'carrying the fire' that the man seeks his salvation, but such salvation can only be obtained by reproducing the anthropocentric foundation of ideology. The novel's religious allusions therefore pose the question: do the man and boy ultimately succeed in overcoming the apocalyptic ending of human history through their repetition of carrying the fire and their construction of themselves as the 'good guys', or is such redemption merely a final – and ultimately doomed – obfuscation of the real conditions of their existence?

The Salvation of the Geologic Agent

In approaching this question, it is useful to identify how the biblical promise of salvation is conventionally re-imagined in ways that recapitulate an anthropocentric faith in human power over nature. Karolyn Kinane and Michael A. Ryan have noted that both Judeo-Christian and contemporary post-religious apocalyptic traditions share an 'existential dimension' that 'contends that humanity's overriding task is to fathom the hidden patterns that reveal the true temporal and spatial contours of reality'.[108] It is the resolution of this quest for a totalising 'truth' that founds the meaningfulness of the apocalypse in both traditions. In modern apocalyptic narratives, however, particularly ones which draw upon the generic resources of science fiction, the pursuit of metaphysical 'truth' found in religious apocalyptic narratives is often reworked as the pursuit of the technological and scientific knowledge necessary to enframe nature.

A recent mainstream example of this reworking, which also exhibits an overt concern for anthropogenic climate change, is the 2004 film *The Day After Tomorrow*. In this film a fictional climatologist called Professor Jack Hall looks for the 'hidden patterns' of global weather systems by using evidence from greenhouse gases trapped in Antarctic ice cores to build up a statistical model of ancient climate change. To borrow Kinane and Ryan's terminology, these are effectively 'hidden patterns' from the past that will allow Jack to reveal the 'contours of reality', the shape of the climate and the effect of human activity upon it. Such patterns represent Jack's attempts to categorise and make sense of the world, and in this sense constitute a scientific enframing of nature that is reminiscent of Kerans' scientific mission in *The Drowned World*. Yet if, as Sarah Dillon notes, 'apocalypse has been associated not just with revelation as disclosure but more significantly with revelation as prophecy' in the biblical tradition,[109] then Jack's use of data from the ice cores as a means of predicting future climate change also casts him as a prophet.

These parallels with aspects of the biblical apocalyptic tradition provide a useful insight into how this tradition marks a contemporary narrative of anthropogenic climate change. *The Day After Tomorrow* begins its process of associating Jack's scientific revelations and prophecy with apocalyptic imagery in the opening sequence, where Jack and two assistants are shown extracting an ice core. There is a deep rumbling sound and a crack opens up in the ice beneath their feet as

the vast ice shelf they are standing on begins to break off. The quaking ground in this scene references the earthquake described in *Revelation* when the sixth seal is opened.[110] Later, the formation of the super storms throughout the northern hemisphere – which occur as Jack had foreseen – is reminiscent of the darkening of the sky that follows the earthquake. Similarly, the descending of the 'freezing air' from above that instantly kills those not in possession of Jack's revelations recalls the 'fire' cast down from heaven in *Revelation,* a fire which consumes those 'nations in the four corners of the Earth' which are 'deceived'.[111]

These 'deceived' – those who reject Jack's scientific knowledge – are specifically depicted in the film through scenes in which Jack presents his findings to stubbornly resistant officials and politicians. In the second scene of the film, immediately following the opening up of the ice crack, Jack is shown giving testament to a global warming conference in Delhi. Despite the markedly unusual weather outside the conference, the world's governments are depicted as blind to the truth Jack is bringing them. At one point Jack tells the conference that the climate is 'fragile', to which the US Vice-President retorts that the 'economy is every bit as fragile as the environment...Perhaps you should keep that in mind before making sensationalist claims'.[112] Jack's attempts at revelation are therefore not simply resisted by naïve or ignorant governments, but are specifically identified as dangerous threats to the smooth functioning of the economy. This representation of Jack's scientific research as politically and economically dangerous also implies that the government is a follower of an alternative belief system; they are worshippers, as it were, of the false idol of capital.

The eventual fulfilment of Jack's revelatory quest, and of his parallel role as father attempting to reunite with and save his son, is contingent on both the film's narrative legitimation of his scientific revelations, and the progress of the apocalyptic events themselves. These events bring about the destruction of the developed northern hemisphere, in particular North America, in a kind of doubly symbolic 'fall of Babylon'. This is doubly symbolic because this 'falling' of the corrupting and polluting 'north' is itself reminiscent of the Biblical references to the fall of Babylon in *Revelation*, which has been widely interpreted as a symbolic reference to immorality, corruption and tyranny in general, and to Rome in particular.[113] By the end of *The Day After Tomorrow*, the 'modern Rome'[114] of the USA has fallen, but those who have followed Jack's advice and journeyed south to Mexico are now able to build a new USA. These environmental refugees include the Vice-President, who has inherited the presidency from his predecessor and has effectively converted to Jack's revelation after his initial scepticism. This conversion is conveyed when the Vice President agrees to write-off all Third-World debt, and in so doing symbolically rejects the false idol of capitalism. Thus Jack has succeeded, within the terms of the narrative, in transcending his initial state and context as disempowered scientist and becomes an almost messianic figure upon whose revelations the survival of America's industrial modernity depends.

We can see then that the film's narrative repeats a Judeo-Christian rhetorical performance of truth as revelation, and the promise that salvation awaits those who turn from the false to the true. Crucially, this 'truth' is not coded as moral or spiritual, but is rather framed as scientific knowledge. Yet it is through this 'truth' that both characters and audience are invited to make sense of the anthropogenic climate change that is depicted. In this way, *The Day After Tomorrow* can be read as a modern, post-religious re-telling of the Judeo-Christian apocalypse, figured within the specifically contemporary context of anthropogenic climate change. This re-telling retains broader concerns and rhetorical conventions from the biblical apocalyptic tradition, such as the destruction of the city/state/capital, and more particularly recapitulates the primacy of truth seeking in obtaining salvation. It is through his scientific truth seeking that Jack ultimately achieves salvation both for himself and others. But this salvation is also contingent upon the underlying anthropocentric assumption that the film reproduces; that environmental apocalypse is merely a transitional challenge to be contained by the power of human technoscience to reveal 'the true temporal and spatial contours of reality'.[115]

In *The Road*, the promise of salvation is related through the anthropocentric subtext of the 'fire', which we have seen speaks to technological ways of exerting power over nature as well as maintaining moral claims of truth. Yet in contrast to *The Day After Tomorrow*, any hope of salvation in *The Road* is complicated by the apparent inescapability of the death of the biosphere itself. Louise Squire has noted that readings of the novel tend to be divided by 'competing claims as to whether it offers some kind of (often biblically rendered) redemptive hope for humanity',[116] or portrays humanity 'beyond the point of no return'. The former analysis is evident in Kunsa's reading of the novel, in which she asserts an 'unexpectedly optimistic worldview'.[117] But in coming to this conclusion she proposes a reading of the boy as an 'Adamic' figure whose encounter with another family after the man has died promises a 'beginning'.[118] This beginning, she suggests, evokes a 'means of looking forward' that registers 'eloquent hope'.[119] Yet this sense of eloquent hope cannot be read in isolation from what Squire describes as a physical world that has 'all but ceased to sustain on-going life'.[120] This 'deathly' physical world – which we have already seen is also registered through the novel's sparse textuality, and through the fragmentation of the biosphere into dislocated spatial and temporal markers that herald a 'formless […] age to come'[121] – seems to render any human attempt to maintain 'eloquent hope' as ultimately meaningless. Such hope appears to ignore the cold finality and material reality of the apocalyptic world that simply 'is'. That the text provides no counter to the man's ruminations on the world 'wink[ing] out forever'[122] or to the 'trackless' and 'unremarked' image of the Earth circling the sun like any other 'dead' planet,[123] is critical to understanding these material conditions.

The inescapable finality of the novel's apocalypse is underlined in its final paragraph, which describes the deep mountain glens in which brook trout once lived in a stream. The backs of

these trout display 'vermiculate patterns that were maps of the world in its becoming'. The 'world' these maps represent is 'a thing which could not be put back. Not be made right again'.[124] The glens themselves are described as 'older than man'.[125] As Kenneth K. Brandt notes in his analysis of this final passage, which acts as a short postscript to the man and boy's journey, the perspective shift to an image of pre-apocalyptic biological nature conveys 'what has been so searingly absent from the novel: humanity's essential need to exist in concert with functioning ecosystems'.[126] In this final moment we leave the journey of the now deceased man and his surviving son in the apocalyptic world and journey back in time through geologic history, a sense of which is evoked in the references to the 'world's becoming' and to a biosphere that is 'older than man'. This shift in historical perspective reminds readers that they have been witnessing the material conditions of the world after a traumatic and irreversible disconnection from nature.

As Brandt further notes, the 'maps' on the trout's backs recall the fragmented map the man and boy had used on their journey.[127] I would suggest that these biological maps, in contrast to the shattered anthropocentrism of that fragmented 'oilcompany roadmap', register a sense of the biosphere itself as the overarching spatial and temporal entity that has been lost and which cannot be redeemed. This image recapitulates the man and boy's disconnection from that biosphere in the 'ending' of the apocalyptic event. It is this biosphere that is 'a thing which could not be put back. Not be made right again',[128] either by 'carrying the fire' or through that act's technoscientific subtext.

The Road therefore provides no final hint of the biosphere itself being reborn, as we find for example in an image of Earth in the closing shot of *The Day After Tomorrow* or the return of rain in the last line of J. G. Ballard's *The Drought*. Instead, we are left with the certain knowledge of the end of all life, in a manner more reminiscent of the closing of Nevil Shute's nuclear apocalypse *On The Beach* (1957). There is to be no redemption of the biosphere or the species life of humans, and any faith in overcoming the apocalyptic ending of human history by 'carrying the flame' appears to obscure the reality of the climatic conditions that mark this end

Disrupting The Repetition of Apocalyptic Salvation

Any residual hope and salvation in the novel therefore seems to rest in the spiritual sense 'carrying the fire'. However, even this more biblical promise of salvation is disrupted by *The Road*'s confrontation with its own biblical allusions. These allusions are particularly significant during the man and boy's encounter with Ely, an old man they meet on the road. Some commentators have identified Ely with the prophet Elijah,[129] however, such readings are complicated by Ely's own claim that 'there is no God and we are his prophets'.[130] This claim underlines how the human understanding of the universe through 'prophesy' is misleading; it is an understanding that is

validated by human repetition rather than the existence of God. In this way, Ely's role in the text as a prophet is self-consciously complicated in a way that forecloses any route to salvation through a higher spiritual authority. Indeed, Ely goes on to repudiate the prophetic repetition promised by his name by denying this naming:

> Is your name really Ely?
> No.
> You don't want to say your name.
> I don't want to say it.
> Why?
> I couldn't trust you with it. To do something with it. I don't want anyone talking about me. To say where I was or what I said when I was there...I think in times like this the less said the better.[131]

Ely's reservations in this passage about clarifying his identity, and his questioning of the wisdom of saying anything at all, seem to undermine attempts to read his presence in the text as a prophet. It is as if in denying his name to the man, Ely is urging the reader to discount reading him as a biblical allusion. This denial forestalls reading the plot as a repetition of the biblical apocalyptic tradition of salvation. Ely can provide neither material salvation in the manner of Jack from *The Day After Tomorrow*, nor metaphysical salvation in the manner of his biblical namesake Elijah. Ely's concern that the man might 'do something with'[132] his name underlines this point; this 'doing' is nothing less than the 'reading' of Ely as a prophet who announces a repetition of the biblical apocalypse. By resisting such a reading, Ely instead presents the man – and the reader – with a defamiliarisation of the biblical apocalypse, an apocalypse that has occurred without prophesy by the time of the encounter on the road, and from which no salvation is possible. This defamiliarisation of the biblical apocalypse is the novel's final expression of the un-announced but immanent apocalypse of *avenir*, through which the reader is invited to view the unfamiliar world of the Anthropocene.

In this way, *The Road* can be understood as a distinct apocalyptic narrative that disrupts both the biblical tradition itself and the post-religious apocalypse of stories such as *The Day After Tomorrow*. Whilst *The Day After Tomorrow* might initially seem to provide a warning about climate change, it in fact repeats the anthropocentric view of an unending human history implied by Kermode by offering a technoscientific salvation that ultimately recuperates the anthropocentric enframing of nature as a resource. It is after all the desire to scientifically categorise and understand nature – which underpins the exploitation of that nature through the technological horizon described by Heidegger – that is appropriated as a practice through which Jack is brought

into being as a messiah-scientist. By contrast, *The Road* suspends either godly or scientific salvation and imagines an actual end to human history that is not obscured by the traditional apocalyptic narrative's promise of salvation. Instead, this actual end arrives without announcement and forces readers to reappraise both their dependence upon the biosphere and the finitude of human species history. In so doing, the text presents a powerful speculative narrative for thinking through anthropogenic climate change within a growing consciousness of the Anthropocene.

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[19] Clark, 'Derangements of Scale', p. 153.
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[30] Leo Bersani, 'Variations On a Paradigm', *New York Times*, 11 June 1967 <http://www2.nytimes.com/books/00/06/25/specials/kermode-ending1.html> [accessed 27 June 2010].
[31] Dillon, p. 387.
[32] Jacques Derrida, 'Of an Apocalyptic Tone Newly Adopted in Philosophy', in *Derrida and Negative Theology*, ed. by Harold Coward and Toby Foshay, trans. by John P. Leavey Jr. (Albany: State University of New York, 1992), pp. 25–71.
[33] Derrida, 'Of an Apocalyptic Tone Newly Adopted in Philosophy', p. 58.
[34] Jean Baudrillard, *Fatal Strategies*, trans. Philip Beitchman and W.G.J. Niesluchowski, ed. by Jim Fleming (London: Pluto, 1990), p. 138.
[35] It should be noted that the term 'post-human' has been used in a variety of related critical contexts, including Donna Haraway's 'A Manifesto for Cyborgs' and animal studies. More recently the term has found currency in relation to apocalyptic contexts that confront anthropocentric perspectives in fiction, philosophy, and popular science. For an introduction to this usage, see Ivan Callus and Stefan Herbrechter, 'Posthumanism', in *The Routledge Companion to Critical and Cultural Theory*, ed. by Simon Malpas and Paul Wake, 2nd edn (London: Routledge, 2013), pp.144-153 (p. 152).
[36] The key word here is 'registers', because there are limits to the textual representation of *avenir;* the text itself is a literary artefact that can be said to constitute a form of 'announcement' within the context of its publication and reading.
[37] McCarthy, *The Road*, p. 93.
[38] McCarthy, *The Road*, p. 93.
[39] McCarthy, *The Road*, p. 93.
[40] McCarthy, *The Road*, p. 81.
[41] McCarthy, *The Road*, p. 193.
[42] Alan Stoekl, '"After the Sublime," after the Apocalypse: Two Versions of Sustainability in Light of Climate Change', *diacritics*, 41 (2013), 40-57 (pp. 52-3) <http://dx.doi.org/10.1353/dia.2013.0013>.
[43] Stoekl, p. 53.
[44] Gabriella Blasi, 'Reading Allegory and Nature in Cormac McCarthy's *The Road*: Towards a Non-Anthropocentric Vision of the Language of Nature', *arcadia*, 49 (2014), 89-102 (p. 90) <http://dx.doi.org/10.1515/arcadia-2014-0006>.
[45] M. M. Bakhtin, *The Dialogic Imagination: Four Essays*, ed. by Michael Holquist, trans. by Caryl Emerson and Michael Holquist (Austin, TX: University of Texas Press, 1981), p.98.
[46] Alex Albright, 'Ammons, Kerouac and Their New Romantic Scrolls', in *Jack Kerouac's 'On The Road'*, ed. by Harold Bloom (Broomall, PA: Chelsea House Publishers, 2004), pp. 115-140 (p. 137).
[47] This American pastoral ideal is also often disrupted by technology, as Leo Marx identifies in *The Machine in the Garden* (1964). The encounter with the diesel train discussed earlier, which

interrupts the scenery of an apocalyptic wilderness, recalls the disruptive sound of a steam locomotive in Thoreau's *Walden*, to which Marks also calls our attention. See Leo Marx, *The Machine in The Garden: Technology and the Pastoral Ideal in America* (Oxford: Oxford University Press, 2000), p. 13.

[48] Albright, p. 137.

[49] Katie Mills, *The Road Story and the Rebel* (Carbondale, IL: Southern Illinois University, 2006), p. 39.

[50] McCarthy, *The Road*, p. 22.

[51] McCarthy, *The Road,* p. 23.

[52] Nora Kestermann, 'Ralph Waldo Emerson versus Cormac McCarthy: The Annihilation of Emerson's Values in McCarthy's The Road', *Current Objectives of Postgraduate American Studies*, 11 (2010) <http://copas.uni-regensburg.de/article/view/129/153> [accessed 17 October 2014].

[53] Kestermannm 'Ralph Waldo Emerson versus Cormac McCarthy'.

[54] McCarthy, *The Road*, p. 244.

[55] Mark Stockdale, 'Conrad's Sea: Invisibility and the Death of Symbol', *Conradiana*, 38 (Spring 2006), 1-16 (p. 7).

[56] Herman Melville, *Moby Dick* (London: Penguin 2001), p. 544.

[57] David Kronemyer, 'Being-in-the-Ocean: Moby Dick, Spatiality and Unheimlichkeit', <http://wordandobject.com/2008/10/being-in-the-ocean-moby-dick-spatiality-and-unheimlichkeit/> [accessed 13th January 2011].

[58] J. G. Ballard *The Drowned World* (London: Harper Perennial, 2006), p. 175.

[59] McCarthy, *The Road*, p. 81.

[60] McCarthy, *The Road*, p. 4.

[61] McCarthy, *The Road*, pp. 43-4.

[62] Etienne Turpin, 'Who Does the Earth Think It Is, Now?', in *Architecture in the Anthropocene: Encounters Among Design, Deep Time, Science and Philosophy*, ed. by Etienne Turpin (London: Open Humanities Press, 2013) <http://dx.doi.org/10.3998/ohp.12527215.0001.001>.

[63] McCarthy, *The Road*, pp. 203-4.

[64] McCarthy, *The Road*, pp. 72-3.

[65] Derrida was also concerned with the question of *survivance*, or 'living on'. In his essay 'Living On' Derrida raises the question of how authorship 'lives on' beyond the 'borderlines' of the text. The living on of the man and boy beyond the borderline of the end of human history poses a similar question for how the narrative of *The Road* imagines a world beyond the 'death' of the literary. See Jacques Derrida, 'Living On', in *Deconstruction and Criticism*, trans. by James Hulbert (New York, NY: Continuum, 1979), pp. 75-176.

[66] McCarthy, *The Road*, p. 54.

[67] Graulund, p. 68.

[68] McCarthy, *The Road*, p. 29.

[69] McCarthy, *The Road*, p. 32.

[70] Petter Skult, 'The Post-Apocalyptic Chronotope', <http://www.inter-disciplinary.net/critical-issues/wp-content/uploads/2012/05/postapocalypticchronotope_skult.pdf>.

[71] Kurt Vonnegut, *Slaughterhouse 5* (London: Vintage, 2000), p. 19.

[72] Cathy Caruth, 'After the End: A Response', *Studies in the Literary Imagination*, 41 (2008), 121-129 (p. 125).

[73] Caruth, p. 125.

[74] McCarthy, *The Road*, pp. 43.

[75] McCarthy, *The Road*, p. 24.

[76] McCarthy, *The Road*, p. 25.

[77] McCarthy, *The Road*, p. 25.

[78] McCarthy, *The Road*, p. 27.

[79] Skult, 'The Post-Apocalyptic Chronotope'.

[80] McCarthy, *The Road*, p. 54.
[81] McCarthy, *The Road*, p. 81.
[82] Louise Squire, 'Death and the Anthropocene: Cormac McCarthy's World of Unliving', *Oxford Literary Review*, 34 (2012), 211-28 (p. 219) <http://dx.doi.org/10.3366/olr.2012.0042>.
[83] McCarthy, *The Road*, p. 32.
[84] McCarthy, *The Road*, pp. 27-8.
[85] Ruth Irwin, *Heidegger, Politics and Climate Change: Risking It All* (London: Continuum International Publishing, 2008), p 174.
[86] McCarthy, *The Road*, p. 192.
[87] McCarthy, *The Road*, pp. 220-1.
[88] McCarthy, *The Road*, p. 147.
[89] McCarthy, *The Road*, p. 138.
[90] McCarthy, *The Road*, p. 93.
[91] McCarthy, *The Road*, p. 121
[92] McCarthy, *The Road*, p. 212.
[93] Cătălin Avramescu, *An Intellectual History of Cannibalism*, trans. by Alistair Ian Blyth (Princeton, NJ: Princeton University Press, 2009), p. 2. Avramescu gives examples such as cases of shipwrecked sailors eating their fellow survivors.
[94] McCarthy, *The Road*, pp. 118-121.
[95] Jonathan Swift, 'A Modest Proposal for Preventing the Children of Poor People from Becoming a Burthen to their Parents or the Country, and for Making them Beneficial to the Public', in *A Modest Proposal and Other Prose* (New York, NY: Barns & Noble Publishing, 2004), pp. 226-235.
[96] McCarthy, *The Road*, p. 136.
[97] Skult, 'The Post-Apocalyptic Chronotope'.
[98] McCarthy, *The Road*, pp. 77-8.
[99] Judith Butler, *The Psychic Life of Power* (Stanford, CA: Stanford University Press, 1997), p. 119.
[100] Butler, p. 124.
[101] Butler, p.124.
[102] McCarthy, *The Road*, p. 136.
[103] Ray Mears, *Essential Bushcraft* (London: Hodder & Stoughton, 2003), p. 101.
[104] Mary Shelley, *Frankenstein; or the Modern Prometheus* (London: Penguin, 1992).
[105] *Prometheus*, dir. by Ridley Scott (20th Century Fox, 2012).
[106] McCarthy, *The Road*, p. 87.
[107] McCarthy, *The Road*, p. 59.
[108] Karolyn Kinane and Michael A. Ryan, *End of Days: Essays on the Apocalypse from Antiquity to Modernity* (Jefferson, NC: McFarland, 2009), p. 225.
[109] Dillon, p. 388.
[110] Revelation 6:12.
[111] Revelation 20:7-10.
[112] *The Day After Tomorrow*, dir. by Roland Emmerich (20th Century Fox, 2004).
[113] Paul Brooks Duff, *Who Rides the Beast?: Prophetic Rivalry and the Rhetoric of Crisis in the Churches of the Apocalypse* (Oxford: Oxford University Press, 2001), p. 3.
[114] Cullen Murphy, *Are We Rome?: The Fall of an Empire and the Fate of America* (Boston, MA: Houghton Mifflin Harcourt, 2007).
[115] Kinane and Ryan, p. 225.
[116] Squire, p. 218.
[117] Kunsa, p. 58.
[118] Kunsa, p. 67.
[119] Kunsa, p. 69.
[120] Squire, p. 219.
[121] McCarthy, *The Road*, p. 81.

[122] McCarthy, *The Road*, p. 93.
[123] McCarthy, *The Road*, p. 193.
[124] McCarthy, *The Road*, p. 307.
[125] McCarthy, *The Road*, p. 307.
[126] Kenneth K. Brandt, 'A World Thoroughly Unmade: McCarthy's Conclusion to *The Road*', *The Explicator*, 70 (2012), 63-66 (p. 63) <http://dx.doi.org/10.1080/00144940.2012.663814>.
[127] Brandt, p. 65.
[128] McCarthy, *The Road*, p. 307.
[129] William Kennedy, 'Left Behind', *New York Times*, 8 October 2006 <http://www.nytimes.com/2006/10/08/books/review/Kennedy.t.html?pagewanted=print> [accessed 27 October 2009].
[130] McCarthy, *The Road*, p. 181
[131] McCarthy, *The Road*, p. 182.
[132] McCarthy, *The Road*, p. 182.

Chapter 3: The Science and Scientists of the Anthropocene in Kurt Vonnegut's *Cat's Cradle* and *Galapagos*

In the previous two chapters of this thesis we have seen how the speculative literary resources of three apocalyptic fictions help readers to think through some of the 'missing thought experiments'[1] of the Anthropocene, and in so doing can serve to reveal and critique the anthropocentric foundations of ideology. These insights provide timely and urgent ways to understand the problem of anthropogenic climate change, and also highlight the ways in which such understanding is routinely obscured. Yet in thinking about anthropogenic climate change in these ways, we must also confront how any idea of responding to the crisis is itself structured by scientific understandings. Whether thought of in terms of grassroots activism or international treaties, such a response will necessarily imply a particular conceptualisation of how the resulting world might – or should – be organised, and assumes the possibility of a meaningful intervention that will produce that world. Any understanding of how to respond is therefore contingent upon two critical questions that are complicated by the difficulties of complexity and differing scales of history that attend the concept of the Anthropocene: how the human relationship with the biosphere is thought about, imagined, and understood by science; and the ways in which that science is put to use in attempting to intervene in the biosphere. How literary fiction can help readers to think through and beyond these open questions of the Anthropocene is the focus of the second half of this thesis. I begin in this chapter by examining how Kurt Vonnegut's *Galapagos* and *Cat's Cradle* anticipate these two questions, and how by offering imaginative depictions of evolutionary and ecological science and ironic depictions of scientists, draw attention to the limits of anthropocentric ways of thinking about and intervening in the human relationship with the biosphere.

"The Destroyer of Worlds": The Scientist's Apocalyptic Power Over Nature in *Cat's Cradle*

The capacity for human beings to intervene in the biosphere is inextricably linked with science. Chakrabarty underlines this link in his four theses when he asserts that 'in the era of the Anthropocene, we need the Enlightenment (that is, reason) even more than in the past'.[2] For Chakrabarty 'reason' denotes the application of scientific understandings of the world to understanding humanity's relationship with the biosphere and formulating responses to the Anthropocene. This assertion assumes that scientific reason provides a means of articulating how

the world should be organised in terms of the relations between humans and the other parts of the biosphere, and frames such reason as a means of intervening in the anthropogenic transformation of the biosphere to achieve that outcome. But he also observes that there is 'one consideration that qualifies [optimism] about the role of reason' in responding to the challenges posed by the Anthropocene, and that this is that 'politics has never been based on reason alone'.[3] By this he means that there are non-scientific considerations – such as public opinion, global inequalities, and vested economic interests – that mediate understandings of, and responses to, the Anthropocene. These mediating factors mean that no organised response to the emerging consciousness of the Anthropocene will be purely 'reason'-based. Yet even this qualification is incomplete. Chakrabarty leaves undisturbed the question of how the uses to which scientific 'reason' is put in providing technoscientific solutions to the problem of anthropogenic climate change might themselves be inscribed by anthropocentric assumptions about both the legitimacy – and the efficacy – of enframing nature as a resource. These uses are after all nothing less than those of technoscientific power over nature, which as we saw in the Introduction tends to treat the biosphere as an object of limitless exploitation by the human subject.

Vonnegut confronts the implications and limits of these uses in *Cat's Cradle*, a novel that depicts the consequences of a technoscientific attempt to manipulate the biosphere for ostensibly military purposes. Whilst the novel is often summarised as a specifically Cold War fiction that satirises the scientific logic underpinning the development of nuclear weapons,[4] its depiction of the apocalyptic implications of human attempts to deliberately manipulate nature raises apposite questions about the faith in technoscience as a means of intervening in the environmental conditions of the Anthropocene. These consequences are relayed to the reader in the novel's familiarly apocalyptic ending, which anticipates the destroyed biosphere of *The Road*: the seasons end and the air is left 'deathly still';[5] the transformed world has been 'locked up tight' so that it will be winter 'now and forever'.[6] In contrast to the unknown cataclysm of *The Road*, however, the material cause of this changed climate is definitively described by Vonnegut's narrator, a man who calls himself Jonah. *Ice-nine* – an anthropogenically-modified version of water with a melting point of 'one-hundred-fourteen-point-four-degrees Fahrenheit'[7] – converts all water with which it comes into contact into more *ice-nine*. Like the thin layer of oceanic pollution that causes the eponymous drought in Ballard's *The Drought* (1965) or the nuclear isotopes in Nevil Shute's *On The Beach* (1957), *ice-nine* is an anthropogenic substance that interacts with the biosphere to bring about a critical transformation of that biosphere on a global scale. It is this technoscientific intervention that causes the novel's final apocalypse.

As a symbol of the human power over nature, *ice-nine* at first appears straightforward; it is the creation of a scientist called Dr Felix Hoenikker that embodies this power by allowing its human creator to manipulate the biosphere. But Hoenikker's own agency in wielding such power

is complicated by his representation in the narrative. Hoenikker is unique amongst the novel's major characters because he is already dead by the time Jonah's narration of events begins. Consequently, Hoenikker's motives and actions are relayed to the reader through a series of narrative frames. Most of these are associated with the different characters that Jonah encounters, whilst one is relayed through Jonah's own overarching narrative. Each of these narrative frames casts Dr Hoenikker's agency in respect of *ice-nine* in a different way, and it is through the ironic distance between some of these frames that the novel begins to explore both the extent – and limits – of Hoenikker's scientific power over nature.

Two of the narrative frames provided by the characters that Jonah encounters early in the text depict Dr Hoenikker as an embodiment of the technoscientific manipulation of nature. The first such frame is that provided by Dr Breed, a former colleague of Dr Hoenikker at the fictional General Forge and Foundry Company in the equally fictional city of Ilium. Breed describes Hoenikker to Jonah as a scientist who is 'a pure-research man […] full of projects of his own'.[8] Breed defines such scientists as those who 'work on what fascinates them, not on what fascinates other people',[9] and who are paid to 'increase knowledge, to work toward no end but that'.[10] Such knowledge is important, we are told, because 'the more truth we have to work with, the richer we become',[11] a claim that associates Hoenikker's apparent purity of purpose within a larger economic and social project. Breed suggests then that Hoenikker's scientific enquiry is untainted by the interests of the company he works for or the larger society he inhabits, but also that its technoscientific outcomes nevertheless serve the economic context within which this work takes place. In this way, Breed's depiction of Hoenikker lays claim to a faith in the promises of technoscience to exert beneficial power over nature, and moreover frames Hoenikker as a figurehead for this faith. Indeed, Breed's account implies an almost heroic rendition of Hoenikker, underlined by his claim that the 'pure research' he conducts takes place in 'shockingly few other places in this country'.[12]

The second significant narrative framing of Hoenikker is that provided by his son Newt Hoenikker. In a letter to Jonah, Newt relates an anecdote about his father's reaction to a successful test of the atomic bomb: '[…] a scientist turned to Father and said, "Science has now known sin." And do you know what Father said? He said, "What is sin?"'[13] This anecdote suggests that Hoenikker rejects the validity of 'sin' as a category of analysis within the secular paradigm of scientific knowledge in which he works. He appears unaware of the moral implications of the successful nuclear test and is uninterested in the questions that it poses for his colleague. 'Sin' is not a physical force or characteristic of the material universe. It is not possible to answer Hoenikker's question in the scientific terms he requires; questions about sin are philosophical, theological, or ideological rather than scientific. Dr Hoenikker appears to display no interest in such considerations. His only interest is in the instrumentalisation of science to wield power over

nature. In this way, Newt's account of Dr Hoenikker lays claim to a particular kind of faith in technoscience to exert power over nature, one which underscores the dangerous consequences of such power and frames Dr Hoenikker himself as a type of anti-hero.

Clearly, both Dr Breed and Newt provide Jonah with accounts of Dr Hoenikker that emphasise that he is a scientist with a very narrow interest in his own scientific pursuit of knowledge, and with no interest in the wider non-scientific uses or implications of this pursuit. Like Breed, Newt essentially frames Hoenikker as a 'pure research man'. Yet the 'purity' of Hoenikker's scientific mind is compared by Newt to that of an unemotional and cold monomaniac. Where Breed frames this purity in terms of an heroic isolation from 'what fascinates other people', Newt draws attention to how this purity manifests a lack of interest in how the instrumentalisation of his scientific work is involved in the military-industrial interests of his employer, and *does* in fact have implications for other people.

Together, these two accounts of Hoenikker appear to frame the scientist who creates *ice-nine* in differentiated but familiar ways. Both the 'pure research man' described by Dr Breed and the cold monomaniac described by Newt represent recognisable archetypes of scientific characters. Roslynn Haynes has identified a number of such archetypes, which range from the 'heroic adventurer' suggested by Dr Breed's account, to the 'inhuman researcher' implied by Newt's anecdote.[14] Cyndy Hendershot has similarly drawn attention to the fictional representation of scientist as 'potentially hero, potentially villain', and in particular identifies how scientist characters in Cold War fictions were often represented as both simultaneously, at least until the resolution of the narrative.[15] This liminality is important, because it highlights how both of the archetypes suggested by Breed and Newt share the implicit assumption that the scientist – whether as 'hero' or 'villain' – represents an ultimate manifestation of the human power over nature.

However, the text's archetypal representations of Dr Hoenikker are complicated by the way that he is framed through the narration of Jonah. Jonah, who never meets Hoenikker, introduces himself as a writer attempting to write a novel about the day of the Hiroshima bombing:

> I began to collect material for a book to be called *The Day the World Ended*. The book was to be factual. The book was to be an account of what important Americans had done on the day when the first atomic bomb was dropped.[16]

It is in researching this book that Jonah meets with relatives and colleagues of Dr Hoenikker, and the accounts provided by Dr Breed and Newt are part of this research. However, Jonah's assertion

that *The Day the World Ended* was to be a 'factual' book immediately suggests a discontinuity between this type of book and Jonah's narrative in *Cat's Cradle*. This discontinuity is underlined in the following lines when Jonah goes on to declare that whilst *The Day the World Ended* '[…] was to be a Christian book', Jonah himself is 'a Bokononist now'.[17] It is significant that this distinction is signalled in the opening page of the novel, as in doing so Jonah's narrative framing of Dr Hoenikker is self-consciously distanced from a particular convention represented by the unfinished *The Day the World Ended*. But what precisely is the 'factual' convention of writing a 'Christian book' that Jonah disowns?

Mark Voigt has suggested that Jonah's hypothetical *The Day the World Ended* is a reference to John Hersey's *Hiroshima*, which was first published as an issue of the *New Yorker* in 1946, and which 'follows the lives of six survivors of the bombing of Hiroshima from the night before the bomb was dropped to several months later'.[18] Voigt notes that although Hersey's book is factual, it was written in a novelistic style, 'switching back and forth from story to story, interspersing information, describing their emotions and struggles'.[19] This, Voigt suggests, places Hersey in a position of 'omniscient third person' so that *Hiroshima* becomes history as narrative, with a 'type of deterministic force' and an 'emphasis on the causal relationship of events [that] conveys a sense of inevitability'.[20] Whilst Hersey's work is not in any sense sympathetic towards the development or use of nuclear weapons, Voigt's analysis suggests that the conventional narrative of *Hiroshima* reproduces the naturalisation of the logic of pursuing such weapons. Such naturalisation casts the development of nuclear weapons as part of an 'inevitable' history of technoscientific development, and in this sense Hersey's novel recapitulates a larger anthropocentric history of the human power over nature.

If *Hiroshima* can be thought of as an example of the type of book Jonah set out to write, then his initial interest in Dr Hoenikker as a scientist who developed nuclear weapons can also be understood as an attempt to present the causality of nuclear warfare in a way that 'conveys a sense of inevitability'[21], and which in so doing tacitly reinforces the logic of producing nuclear weapons by casting them as necessary and even heroic. The two accounts of Dr Hoenikker provided by Dr Breed and Newt also support such an understanding; despite their differences, both accounts nevertheless recapitulate his ultimate power over nature. Indeed, by framing Dr Hoenikker through archetypes, the accounts of Dr Breed and Newt both appear as 'novelistic'. In this way, the text draws attention to how both characters echo the affirmation of human power over nature that is implied by the 'deterministic force' of *Hiroshima*'s narrative.

It is precisely this form of narrative that Jonah renounces when he declares that whilst *The Day the World Ended* '[…] was to be a Christian book', he is 'a Bokononist now'.[22] With this statement, Jonah explicitly distances the narrative of *Cat's Cradle*, which metatextually constitutes the book he actually writes, from the type of book that Voigt associates with

Hiroshima. This distancing is underscored by Jonah's announcement that he is now a 'Bokononist'. 'Bokononism' is the fictional religion outlined in the course of the novel, and it is through Jonah's account of this religion that an alternative way of thinking about human history – and agency – is gradually articulated by the text. Jonah suggests that the text of *Cat's Cradle* is a form of Bokononist writing,[23] an implication underlined by the novel's self-consciously fictional epigraph, supposedly taken from the fictional *Books of Bokonon*, that 'Nothing in this book is true'.[24] This Bokononist approach to writing is crucial to understanding how Jonah's narrative is self-consciously differentiated from that of *Hiroshima*, and in particular how the novel relays an ironic distance between the figure of the scientist with power over nature – represented by Dr Breed and Newt's accounts of Dr Hoenikker – and the apocalyptic narrative that Jonah unfolds.

Bokononism and The Ironic Distance of Jonah's Narration

Bokononism includes a number of ideas that complicate the narrative conventions that Voigt associates with books such as *Hiroshima*. These ideas include *foma*, the 'harmless untruths' that can make life better and which amount to a rejection of the forms of totalizing historical narrative found in Hersey's book. This rejection is also manifested in the Bokononist idea of *granfalloons*, the 'false' groupings of people in nations and similar geographically-rooted formations. It is precisely these formations that underpin the historicising narrative of *Hiroshima*. By casting such formations as 'false', Bokononism – and the Bokononist narrator Jonah – subordinates their importance in the unfolding of a narrative.

The most significant Bokononist concept for understanding Jonah's narrative however is that of *karass*. Jonah introduces *karass* as the 'teams' of people who are interconnected with each other by fate to do 'God's Will':

> 'If you find your life tangled up with somebody else's life for no very logical reasons,' writes Bokonon, 'that person may be a member of your *karass*' […] a karass ignores national, institutional, occupational, familial, and class boundaries. It is as free-form as an amoeba.[25]

The members of a *karass* are 'tangled up' – presumably like the string of a cat's cradle – with each other's lives. The biological metaphor of an amoeba is particularly revealing as it casts the totality of these interactions as a complex biological entity in a way that anticipates the ecological implications of *karass.* We shall explore these implications presently, but for now it should be sufficient to say that *karass* represents an open and unpredictable multiplicity of interrelations between those individual human subjects that form its 'teams', and which seems to connect these

individuals across the very boundaries that *granfalloons* claim to maintain. Indeed, the 'tangling' Jonah describes is presented as antithetical to the conventional logic of such *granfalloons*: it underlines the Bokononist suspicion of 'factual' narratives such as Hersey's and questions their simple linear conceptualisation of cause-effect relations and human agency. The meaninglessness neologism of *karass* is also important, because it allows the text to give a name to this complex sense of entanglement without seeming to engender it with any further meaning. *Karass* is the text's way of encouraging the reader to imagine an idea of complex causality that serves no totalizing historical purpose but which nevertheless traces the events leading to the final apocalyptic transformation of nature across the individual lives of characters.

In self-consciously rejecting a tradition of realist narratives of history in this way, Jonah's Bokononist narrative distances itself from the narratives of science and the scientist upheld by *Hiroshima* and represented in *Cat's Cradle* by Dr Breed, Newt, and the fictional and unwritten *The Day the World Ended*. And it is through the specific distance between Jonah's narrative and these traditional realist narratives of history that the novel ironically reveals the limits and absurdities of the faith in technoscientific power over nature that these same traditions perpetuate. An example of how this ironic distance is relayed in the novel can be found in a scene in which Jonah relates how Dr Hoenikker's son Frank describes dealing with a stray dog that froze solid after licking a small amount of *ice-nine*:

> 'We put him in the oven,' Frank told me. 'It was the only thing to do.'
> 'History!' writes Bokonon. 'Read it and weep!'[26]

This scene recounts the events shortly after Dr Hoenikker died, taking the knowledge of how to make *ice-nine* with him. Frank and his siblings have an opportunity to destroy the substance forever. Yet Frank does not appear to even consider destroying *ice-nine*. Instead, he tries to manage its destructive potential. But doing so means baking a dog; an absurd act that obscures the possibility of destroying *ice-nine* itself. The Bokonon quote about 'history' with which Jonah immediately follows Frank's statement opens up an ironic distance between Frank's assertion that baking the dog was the 'only thing to do', and Jonah's Bokononist sensibilities that invites us to question this logic and read it as a symptom of 'history'. This history is, as Robert Tally notes, 'the history of incompetent and irrelevant human activity'.[27] The ironic distance between Frank and Jonah frames the baking of the dog as an example of an absurd but recurring tendency throughout the history of industrial modernity: to create the means of destroying the biosphere and to then obscure the dangerous implications of these means through ineffectual claims of being able to control them. In this way, Vonnegut draws the reader's attention to the absurdity of a scientific narrative – such as that offered elsewhere in the novel by Dr Breed's account of Dr

Hoenikker – that attempts to rationally manage a technological product of science as dangerous to the biosphere as *ice-nine*. Jonah offers a counterpoint to such a narrative by signalling how a shared belief in the myth of being able to control such technology can prevent individuals and groups from dealing with the real threat of technoscientific interventions. Like the contradictory Cold War concept of nuclear 'fail-safe', which is by definition unsafe, or the more contemporary notion of 'carbon trading', the myth of being able to manage the risk associated with this technology serves to legitimise its existence. In this way, the scene draws particular attention to the absurdity of a faith in technoscience to enable power over nature, by illustrating how such technoscience cannot be rationally managed.

'A Tentative Tangling of Tendrils': *Karass* and the Limits of Human Agency

This faith is also undermined in the establishing if an ironic distance between Dr Breed's scientific account of *ice-nine* and Jonah's Bokononist account of it, which contrasts Breed's short theoretical narrative of what happens when *ice-nine* is introduced into the environment with Jonah's imaginative version. Breed emphasises *ice-nine*'s theoretical application as a way of saving US Marines from becoming bogged down in mud:

> 'But suppose […] that one Marine had with him a tiny capsule containing a seed of *ice-nine*, a new way for the atoms of water to stack and lock, to freeze. If that Marine threw that seed into the nearest puddle…?'
> 'The puddle would freeze?' I guessed.
> […]
> 'And the pools and the stream in the frozen muck?'
> 'They would freeze?'
> 'You *bet* they would! […] 'And the United States Marines would rise from the swamp and march on!'[28]

Breed's theoretical narrative of *ice-nine* emphasises how it could be used as a way for a single US Marine to exert power over nature by re-ordering the properties of his immediate environment such that they become usable for military operations. The power he describes is clearly that of a technological enframing of the swamp as a resource for such operations; his emphasis on how the Marine will 'rise from the swamp and march on!' in particular suggests this power-use. Yet this belief in the promises of technology to enframe nature as a usable military resource ignores any further implications of the effects of *ice-nine* upon the environment. In particular, Breed's account

ends conspicuously at the point that the Marines 'march on'. By contrast, Jonah's imaginative elaboration of this account speculates upon the further consequences of *ice-nine*:

> "If the streams flowing through the swamp froze as *ice-nine*, what about the rivers and lakes the streams fed?"
> "They'd freeze. But there is no such thing as *ice-nine*."
> […]
> "And the rain?"
> "When it fell, it would freeze into hard little hobnails of ice-nine—and that would be the end of the world!"[29]

Jonah's questions begin with the lakes flowing into the swamp, and trace the path by which a single chip of *ice-nine*, converting liquid water to more *ice-nine* in a single puddle, ultimately causes all of the water in the world to become *ice-nine*.[30] In tracing the progress of *ice-nine* in this way, Jonah also narrativises the interconnected nature of the hydrosphere, through which all water is linked and is in motion – passing through the water cycle of land, rivers, oceans, and rain – and is part of the larger biosphere. In doing so, he draws attention to how the 're-shaping' of one part of the biosphere leads to the unintended transformation of the system as a whole. His consciousness of this complex interconnectivity echoes the Bokononist concept of *karass* that features so prominently in the rest of his narrative, and in particular highlights the limits of human agency to control the technological consequences of its own science. Although not yet a Bokononist during this scene, Jonah's growing Bokononist perspective here is in marked contrast to Dr Breed's narrow assumption that *ice-nine* would allow a controlled and consequence-free manipulation of the environment by the US Marines.

The contrast between Dr Breed's account of *ice-nine* and Jonah's understanding of it in this early part of the novel signals how Jonah's narrative will highlight the limitations of human agency to control the biosphere through the technological products of science. These limitations are also registered in the recounting of the baking of the dog and in the ultimately apocalyptic outcome of *ice-nine*. But the ironic distance between Dr Breed's account of *ice-nine* and Jonah's narrative is underlined when Breed asserts that 'there is no such thing as *ice-nine*'. As Jonah goes on to say in the very next passage 'Dr Breed was mistaken about at least one thing: there was such a thing as *ice-nine*'.[31] Jonah's knowledge of the existence of *ice-nine* is not simply a function of his narrative position in recounting the story retrospectively. More significant is his understanding of the substance as the *wampeter* or 'hub' of his *karass*. It is through this understanding that Jonah is able to see and relate that which Dr Breed cannot; that *ice-nine* does exist, and that its existence is given form through a complex interaction of characters, events, and the biosphere itself.

The full extent of this 'cat's cradle' of interconnected characters and events is significant for its complexity. What begins as a thought experiment described by Dr Breed is produced by Dr Hoenikker as a real substance that he passes to his three children. The Hoenikker children – themselves outcomes of complex histories and genetics – eventually bring *ice-nine* to San Lorenzo, the island where Bokononism originated and where *ice-nine* eventually falls into the sea to interact apocalyptically with the hydrosphere. This event involves the participation of all of the individuals of Jonah's *karass*, including San Lorenzo's dictator 'Papa' Monzano, and the pilot of a jet aircraft that crashes into Monzano's palace. Such a complex tracing of causality cannot be easily distilled into a traditional narratological schema; indeed it is only through reading the novel itself that the full extent and subtlety of this complexity becomes apparent. For example, whilst the text's climactic apocalyptic moment might be summarised in terms of Frank Hoenikker providing Monzano with *ice-nine*, this cause-effect relationship is itself dependent upon such otherwise disparate narrative elements as: the Hoenikker children's collective preserving of *ice-nine*; Bokonon and Edward McCabe's founding of San Lorenzo's government; and the car accident that ultimately led to the death of Felix Hoenikker's wife during childbirth. Such dependencies – and the many others traced or touched upon by Jonah's narrative – undo the kinds of straightforward narrative causality represented early in the text by Dr Breed's account of *ice-nine* and the allusions to Hersey's *Hiroshima*. Furthermore, such complexity highlights the limited scale of Dr Hoenikker's control over his creation; his supposed power over nature appears as a myth when considered against the unfamiliar scale of the 'cat's cradle' of non-linear causation between the interdependent components of his *karass*.

By emphasising complex interactions that cross the traditional boundaries of *granfalloons*, *karass* can then be understood as an imaginative alternative to the traditional focus on 'individual, families, or nations'[32] that Ursula Heise has recently identified in literary responses to climate change. Heise suggests that climate change, like nuclear war, requires a different approach to literary representation, one which emphasises the 'connections between events at vastly different scales' in order to imagine all 'processes of global systemic transformation, ecological or not'. [33] This way of thinking about the human subject's interactions through and with the other human and non-human processes that constitute the biosphere – which the novel registers through Jonah's *karass* and its *wampeter*, *ice-nine* – also suggests a way of thinking about the biosphere as a form of assemblage in the sense described by Isabelle Stengers as a 'coming together of heterogeneous components',[34] and as the de-centred 'mesh' described by Timothy Morton.[35] It is in the Stengersian coming together that the apparent agency of the individual subject is re-imagined as belonging to the *karass*. And it is through *karass* that Jonah's narrative articulates all that Dr Breed ignores; the complex 'assemblage' that gives forth to the creation of *ice-nine*, the need to 'think big' – in Morton's words – in order to understand *ice-nine*'s

narrative journey to San Lorenzo, and its final apocalyptic outcome. In this way, *karass* serves as a literary conceit through which the novel establishes an ironic distance between the account of technoscience offered by Dr Breed – and implied in the narrative conventions of *Hiroshima*/*The Day After Tomorrow* – and that relayed by Jonah. And it is through this conceit of *karass* that the novel ultimately contributes a particular insight into the facile belief in power over nature depicted through Dr Breed. As members of a *karass*, the individual in *Cat's Cradle* is shown to participate in the enactment of *ice-nine*'s transformation of the biosphere. But this *karass* simultaneously marks the limit of human power over that biosphere; *ice-nine* does not bestow control over the biosphere, either to Dr Hoenikker or anyone else. Rather, it constitutes a means of changing the biosphere that is enacted through the uncontrolled and collective life of *karass*. There is therefore a warning at the heart of *Cat's Cradle*'s ironic depiction of *ice-nine*; failing to perceive the limitations of human agency to control the technological implications of its own science in a complex biosphere has apocalyptic consequences.

Reading Ecological Complexity: Science, *Karass,* and the Stories That Intrude

I would suggest that this warning can be understood in the contemporary context of anthropogenic climate change as a particular critique of some of the uses to which scientific reason is put in seeking to intervene in the biosphere. Such uses – depicted in the novel in the economic policy assertions of Dr Breed that 'the more truth we have to work with, the richer we become'[36] and in the material interventions of technoscience represented by *ice-nine* – frame science in terms of what it 'can make happen';[37] as a means of asserting human power over nature in a controlled and deliberate way. But in tracing the 'cat's cradle' of complex interdependences through which *ice-nine* takes form in the novel, Jonah's narrative of *karass* imagines more profound limits to such power than the overt influence of political interests to which Chakrabarty alludes in his discussion of the Anthropocene. Instead of depicting science as a means of enabling and directing human power, the novel underscores how scientific knowledge traces the limits of this directed power. Indeed, in contrast to the power-use of science assumed by Dr Breed, the narrative unfolding of *ice-nine* is more reminiscent of the 'connections between events at vastly different scales' that Heise associates with imagining 'global' processes of transformation.[38] These connections and differentiated scales are themselves reminiscent of the complex interdependencies between humans and the biosphere that attend a consciousness of the Anthropocene, and to which critics such as Morton and Stengers, as well as Timothy Clark,[39] also draw attention. Such consciousness of globally complex connections might be understood in

Jonah's terms as an interconnection of innumerable *karass* in which the supposed power of human agency to control and manipulate nature is rendered absurd.

Indeed, in unfolding these complex interconnections in the text, it is significant that Jonah likens *karass* to an amoeba. Amoeba exist as individual cells, but they also live within larger organisms and in some cases physically bond to each other to form more complex structures. Their 'free-from' nature – upon which Jonah specifically draws in his metaphor – emphasises the ways in which a *karass* changes shape and size in its interactions with the world. This mutability hints at the ways in which innumerable *karass* might be understood as themselves interlinked on a global scale that encompasses, for example, the 'heterogeneous components' described by Stengers. Indeed, the final expression of *karass* is rendered both globally and heterogeneously in the novel's depiction of death after the apocalyptic release of *ice-nine*. As Jonah himself notes whilst surveying the 'blue-white frost' that covers the Earth: 'Death has never been quite so easy to come by […] All you have to do is touch the ground and then your lips and you're done for'.[40] This way of dying draws attention to how Jonah and all other humans are inextricably linked through the hydrosphere to the biosphere itself; it is the water in his own body that will convert to *ice-nine* if he touches the ground and then his lips. Such an act, which he finds is carried out by many of the initial survivors of the apocalypse, traces the cycle of *ice-nine*'s progress from the mind of Felix Hoenikker, through the Hoenikker children to the hydrosphere, and through the hydrosphere to the water within all life on Earth. In the novel's closing imagery of the human body dramatically attesting to its interconnection with the apocalyptically frozen world, the complex 'amoeba' of *karass* shifts to a planetary scale, a shift that simultaneously complicates the supposed boundary between the human subject and the biosphere as object.

Reading *karass* as a way of thinking about humans and the biosphere in terms of a complex web of global interconnections brings us back to the other critical question that I suggested earlier comes into focus around the concept of the Anthropocene. Namely: how the ways in which the human relationship with the biosphere is understood in the Anthropocene serve to underpin any response to anthropogenic climate change. We saw in the previous chapters how the speculative resources of apocalyptic fiction can help readers to think through this relationship in new and disruptive ways. But as with the question of intervention, science also plays a key role in this understanding. For example, when Chakrabarty claims that the scientific 'knowledge of humans as a species, a species dependent on other species for its own existence'[41] is necessary for thinking about the ramifications of the Anthropocene for anthropogenic climate change, he is explicitly attesting to the need for scientific knowledge in approaching such thinking. Yet in doing so, he also tends to ignore the ways in which non-scientific choices and assumptions affect how such knowledge is interpreted, and the uses to which it is put.

Such interpretations and uses are explored and complicated in Vonnegut's later novel *Galapagos*. But before turning to analyse this text it is necessary to examine how the two linked disciplines of science that I go on to suggest the novel is concerned with – ecology and evolution – are premised on concerns for the fluidity and on-going interdependence between parts of the biosphere that are thrown into relief by the Anthropocene. Indeed, both of these disciplines make particular contributions to being able to think about the Anthropocene at all, because they encompass understandings of complex interactions between evolving species – human and non-human – and the non-living elements of the biosphere.[42] These understandings emphasise fluidity and interdependence, and in doing so complicate the privileging of the human and the assumed stability of that 'human' as a species category. It is the capacity of science to provide such understanding that makes possible the Anthropocene's disruptive effect on the anthropocentric foundations of ideology that otherwise legitimise the myth of the biosphere as a discrete object for infinite human exploitation. For example, when Timothy Morton notes that the consciousness of anthropogenic climate change has 'torn a giant hole in the fabric of our understanding' of the world, he draws attention to how this disruptive effect is underpinned by 'sophisticated interdisciplinary science'.[43] The new way of 'ecological thinking' that he suggests is thus opened up involves thinking of the biosphere as a complexly interconnected 'mesh'. But this new way of thinking – like that which I have suggested is invited by Chakrabarty's account of the Anthropocene – depends upon scientific knowledge concerning how humans are organisms and how human and non-human organisms evolve in fluid and changing ways with each other and with the non-biological entities of the biosphere. As Morton also notes, this thinking 'in its full richness and depth was unavailable to non-modern humans'. [44] It is only possible through modern science.

In describing the 'ecological thought', Morton himself draws attention to particular examples of ecological and evolutionary science that are apposite to my reading of both *Cat's Cradle* and *Galapagos*. Whilst rejecting the Gaia-like idea of the 'superorganism' as a way of thinking, he does invoke biological examples as a way of describing the complex interconnections of the 'mesh'. Describing how 'lichen' are in fact a combination of different life-forms, and how the mitochondria of cells in animals and fungi are evolved forms of bacteria that sought refuge from the oxygenation of the biosphere after the Paleoproterozoic era, Morton evidences the 'mesh' with ecological and evolutionary understandings of symbiosis.[45] He goes on to further underscore the validity of thinking about the mesh by referencing Richard Dawkins' evolutionary perspective of the 'extended phenotype', which not only describes how different organisms shape each other, but also how exterior and supposedly non-biological entities – including human built houses – should be considered an 'extension' of the biological expression of genes.[46] These scientific examples simultaneously explain and validate Morton's account of the mesh in ways

that echo Jonah's metaphorical invocation of the 'free-form' of amoeba in describing *karass*. The assemblage of the *karass* is underscored by this metaphor; collectively 'amoeba' are not stable entities with fixed physiologies but rather are fluid organisms existing across taxonomic boundaries and inhabiting other organisms. Like the 'mesh' and the Anthropocene, the concept of *karass* works to disrupt reductionist understandings of the human-biosphere relationship by opening up alternative ways of thinking about that relationship. But these concepts would not be possible – would not begin to be thinkable – without the ecological and evolutionary science that inspires them.

In light of the critique of technoscientific culture offered by Vonnegut in *Cat's Cradle*, it is important therefore to acknowledge a distinction between the ecological and evolutionary scientific thinking described by Morton, and the uses to which this science can be put through the selective instrumentalisation of scientific knowledge as a means of legitimising particular political or economic interests, or through the literal instrumentalisation of science through technology. Yet despite the clearly redemptive role for science in enabling the kinds of different thinking about human relationships with the biosphere that are at stake in anthropogenic climate change, science has also contributed to the unfolding of this crisis. The issue here is with the choices – moral, ethical, political or economic – that are made with regards to scientific knowledge. When Morton suggests that modernity itself has forestalled the kind of ecological thinking he associates with the mesh because of the ways that its economic structures have had a 'damaging effect on thinking itself',[47] he is surely also thinking of the uses to which science has been put by those structures, how in Steven Shapin's words 'the enterprise called science' has been 'enfolded' by them.[48] These uses can be technological; modernity's dependence upon fossil fuels is as we saw in Chapter 1 allied to the anthropocentric thinking that perpetuates that modernity. But these uses can also be purely ideological. The evolutionary psychologist Steven Pinker provides a useful critique of such uses in his description of naturalistic and moralistic fallacy.[49] Pinker describes naturalistic fallacy as the 'idea that what is found in nature is good' and the danger of this is that people draw moral conclusions from scientific observations of natural processes. [50] Moralistic fallacy is the idea that 'what is good is found in nature'.[51] Pinker's formulations of naturalistic and moralistic fallacy can help to account for the means by which scientific knowledge claims become conflated with political and moral ideas as a means of lending some universal and objective validity to non-scientific ideas. Such 'appeals to nature' risk conflating the 'reason' of science with the 'unreasonable' anthropocentric interests of, for example, politics; politics which, as Chakrabarty reminds us, have 'never been based on reason alone'.[52] Indeed, inasmuch as an appeal to nature can be understood as an attempt to naturalise a particular formulation of the human relationship with the biosphere, it also serves an ideological function. By instrumentalising science as a means of presenting such a formulation as natural, the appeal to nature encourages

human subjects to understand their relationship with the biosphere in ways that potentially privilege existing anthropocentric understandings of that relationship. A literary representation of how the instrumentalisation of scientific perspectives on the Anthropocene might serve to naturalise anthropocentric thinking is discussed in the next chapter in relation to Ian McEwan's *Solar*.

The dangers of instrumentalising science through 'appeals to nature' can be understood as marking a complication in the otherwise potentially redemptive role of science in helping us to think differently about our relationship with the biosphere. This does not mean that we should dismiss the neutrality sought by scientists. Rather, it means we must recognise that how science is directed through funding and public or political interests, and moreover how its findings are interpreted and acted upon, are determined by moral, ethical, political and economic choices precisely because science itself strives to be neutral. Shapin alludes to this paradox when he notes a tension between the neutrality sort by scientists with regards to how their findings are interpreted and acted upon outside of science, and the tendency identified by science and technology studies for science to be called upon as the arbiter of 'many social and political decisions'.[53] Even as science might seek to distance itself from politics through its methods, so politics seeks increasingly to draw out political and social uses from scientific knowledge. It is also a corollary to the studied neutrality and objectivity of science that it can tend towards what Morton describes as an attitude of 'detached authoritarian coldness', a description that I would suggest also summarises Dr Hoenikker. But as *Cat's Cradle* goes on to examine, this detached neutrality does not foreclose the ultimately apocalyptic instrumentalisation of Hoenikker's science through collective human choices and the technoscientific production of *ice-nine*.

Stories That Intrude

If the role of scientific knowledge in explaining and responding to anthropogenic climate change can be both redemptive and vulnerable to dangerous forms of instrumentalisation, how then might literary fiction help us to navigate these difficulties and reveal how they unfold through the decisions that are made about that knowledge? In a recent discussion of the Anthropocene, Donna Haraway suggests that it is important to recognise what scientific knowledge – in particular the 'modern synthesis' of evolutionary theories since Darwin – 'can do, can't do…and what they stopped'.[54] This pragmatic stance towards science as both enabling of different ways of thinking, and of potentially limiting other ways of thinking, is particularly useful when negotiating the complex questions that surround relationships between human and biosphere in the Anthropocene. For example, the 'popular reliance on Darwinian evolution as a method of explaining change'[55] that is noted by one recent commentator on Haraway's work has

implications beyond Darwin's original account in *The Origin of Species* of the 'mutation and uncertainty'[56] underpinning evolution. Whilst the infamous phrase 'survival of the fittest' was not coined by Darwin,[57] its association of evolutionary change with competition has arguably had a lasting effect on 'stopping' – or at least discouraging – ways of thinking about the biosphere that are not imagined in terms of competition. These other ways include Lyne Margulis' scientific work on symbiosis and endosymbiosis, which proposes ways in which formerly independent parts of the biota have been symbiotically merged. This account of co-evolution is taken up by Haraway in *When Species Meet* (2008), in which Haraway considers the ways in which contact between symbiotic species, for example in the human contact with dogs, involve the human 'becoming with' the dog through complexly shared 'layers of history, layers of biology, layers of naturecultures'.[58] 'Becoming with' emphasises a complex interaction of forces between dog, human, and also environment, that shape and co-create each other.[59] Such co-creation underlines the complex interdependencies of human and non-human biology and different scales of history that are critical to both Morton's account of the mesh, and the necessary ways of thinking about anthropogenic climate change demanded by the concept of the Anthropocene.

But Margulis' work is controversial amongst neo-Darwinian evolutionary biologists of the so-called 'modern synthesis', including Richard Dawkins. For Dawkins and others, evolution is driven by mutation rather than endosymbiosis, and should be understood in terms of self-interested competition.[60] This distinction – which has more recently been called into question[61] – arguably distracts from the ways in which Dawkins' account of the 'extended phenotype' and the 'selfish' gene can open up ways of thinking about the human-biosphere relationship in the 'co-operative' mode described by Morton as the mesh.[62] But we need not tie ourselves up in knots trying to reconcile these different scientific perspectives in order to arrive at some ultimate understanding of evolution and ecology. Indeed, I would suggest that what is significant about science for Morton – and for us as readers – is not how science might provide us with a final and transcendent understanding of the world with which to make sense of anthropogenic climate change and in so doing arrive at its solution. As Morton also notes, there is no ultimate 'metaposition from which we can make ecological pronouncements'.[63] Moreover, there are potential dangers to seeking such a supposedly transcendental explanation of the human relationship with the biosphere; Isabelle Stengers gestures towards such dangers when she criticises the Anthropocene for lending itself to 'meditations' that encourage 'thinking ultimate thoughts about Man, far, far away from the sordid situation we have created for ourselves and other earthbound critters'.[64] These implicit claims of transcendency above what Stengers refers to as the 'entanglement'[65] can reaffirm an anthropocentric separation from nature, in which the biosphere is an object viewed from the outside by a discrete human observer. For Stengers, the very transcendent uses to which the concept of the Anthropocene has been put have actively

obscured from view the 'situation we have created' through complexly interdependent interactions with the biosphere.

What is most significant in the Anthropocene – indeed what is 'useful' for Morton, Stengers and others about the knowledge provided by science – is not then the possibility of an un-scientific and ultimately misleading promise of transcendent explanation, but rather the ways in which such knowledge can open up different ways of thinking about the human-biosphere relationship. There are potential limits to this usefulness as we have seen: selective interpretations of that knowledge; moralistic fallacies; things that are not thought; and even ways of thinking that are, in Haraway's terms, 'stopped'. But it is here that literature becomes relevant. Morton suggests that art, including literature, can help us 'question reality' as we have become accustomed to perceiving it,[66] and can give 'voice to what is unspeakable elsewhere'.[67] It is through this potential that literature can assist us in thinking through the different scales and interconnections suggested by scientific knowledge, whilst also highlighting the dangerous consequences of moralistic fallacies and the ideological uses to which such knowledge can be put. This is essentially what *Cat's Cradle* does through its intricate and complex narrative unfolding; Jonah's *karass* imagines the amoebic interconnections and fluidity through which human actions have apocalyptic consequences by drawing upon scientific knowledge in imagining *ice-nine* and its consequences whilst simultaneously questioning the promises of science to provide 'power over nature'. In doing do, the novel provides a way to help readers think though some of the difficult moves demanded by the scientific knowledge that underpins the conceptualisation of the Anthropocene.

It is by encouraging such moves that literary fiction makes particular contributions to re-thinking the relationship between human and biosphere. If, as Stengers has also suggested, we can think of certain examples of scientific knowledge as 'stories' that intrude upon the 'deeply ingrained habits of thought' of individuals living under modernity,[68] then the 'giant hole torn in the fabric of our understanding'[69] by the ecological and evolutionary stories of anthropogenic climate change is just such an example of this effect. In a similar vein, I would suggest that the Anthropocene's entanglement of geologic and human histories conveys its own scientific 'story', which also complicates and intrudes upon the dominant 'story' of the history of industrial modernity. This intrusion works by defamiliarising the anthropocentric foundations of ideology – as we have seen in the speculative apocalyptic stories of the Anthropocene in previous chapters. This story encourages the subject of industrial modernity to rethink their anthropocentric understanding of the world so that they can perceive shifts in the scale of human history in which notions of the assemblage of the mesh, and the 'becoming with' of symbiogenesis, become thinkable. And it is the particular emphasis on human and geologic histories that makes this story of the Anthropocene useful; in as much as Morton shows how ecological and evolutionary science

can help us to imagine the biosphere as ecologically connected with the human through the mesh, Chakrabarty points towards how the Anthropocene can help us to imagine a historical story, or narrative, in which the 'becoming with' of this mesh unfolds. The dual histories of human and biosphere that Chakrabarty describes can then be understood as a way to think through how human history has 'become with' the history of the biosphere. But Chakrabarty does not go as far as saying this; instead he draws attention to the difficulty of articulating the entwining of these narratives. How we might fulfil this narrative potential is left open.

I will now demonstrate how the speculative resources of literary fiction can help to make this 'becoming with' thinkable. By bringing the histories of the geologic biosphere and industrial modernity into conversation with each other, Vonnegut's later novel *Galapagos* provides a literary thought experiment that mobilises ecological and evolutionary science in order to intrude upon dominant anthropocentric understandings of the human as a subject external to nature, and helps readers to think though how that subject is in fact entangled within the complex system of the biosphere. This thought experiment not only elucidates how such 'entanglement' might unfold over a geologic future history, but also draws attention to both the possibilities and limitations of science to explain and intervene in anthropogenic climate change.

Hoping for Apocalypse: Imagining the Geologic Future History of Humans in *Galapagos*

The full title of the *Fourteenth Book of Bokonon* – as relayed by Jonah in *Cat's Cradle* – is 'What Can a Thoughtful Man Hope for Mankind on Earth, Given the Experience of the Past Million Years?'.[70] The answer given there, in the single word that constitutes that book, is 'Nothing'.[71] Such a nihilistic view may be true for Bokonon, but Vonnegut's *Galapagos* offers an alternative view of history – a view that might be described as the thoughts of a man given the *next* Million Years. *Galapagos*' narrator is Leon Trout, the son of Vonnegut's recurring science fiction novelist character Kilgore Trout. Leon Trout is a ghost who recounts events in 1986 retrospectively from one million years in the future. This narrative position allows him to describe the industrial societies of late twentieth-century humanity within the *longue durée* of an evolutionary timescale. In the future of Trout's present, humanity has evolved into a new species that he calls the 'fisherfolk', who are fur-covered, seal-like creatures. It is through the contrasts and evolutionary continuities between these future fisherfolk and the humans of 1986 that Trout relays a future history of their co-creation with the biosphere.

Trout's description of this evolution is grounded in a repeated and seemingly scientific concern for the size and characteristics of the brains of humans living in 1986. This concern

appears early in the text when he describes these 'three-kilogram brains' as 'nearly fatal defects in the evolution of the human race'.[72] In this sentence, Trout emphasises two aspects of the brain that appear to contradict the logic of an appeal to nature discussed earlier. The brain is both a part of nature, in that it is a biological consequence of evolution, and a 'defect' that threatens the survival of humanity as a species. Elsewhere in the novel, Trout casts the human brain as a type of tumour, describing it as a growth 'inimical to a healthy and happy humanity'.[73] He also foregrounds its ability to 'lie and lie',[74] and describes it as 'irresponsible, unreliable, hideously dangerous […] simply no damn good'.[75] This depiction of the human brain as a fatally defective yet natural product of evolution signals one of Trout's underlying obsessions: that the brain of *Homo sapiens sapiens* is not itself an example of that which is 'found in nature' being 'good'.[76] Indeed, the 'fatal defect' of this brain implies a long-term evolutionary failure, so that the very existence of the humans of 1986 appears difficult to justify in evolutionary terms.

This focus on the human brain is important for understanding how Trout's future history depicts both the modern humans of 1986 and the future fisherfolk. When, as in the quote above, he emphasises the biological and evolutionary characteristics of the brain, he clearly associates it with the evolutionary species history of humans across geologic timescales. Yet at other times he also quite specifically relates this organ to his view of human history. For example, he frames the brain as the 'source' of the corruption of what he calls the 'innocence' of the planet:

> What source was there back then, save for our overelaborate nervous circuitry, for the evils we were seeing or hearing about simply everywhere?
> My answer: There was no other source. This was a very innocent planet, except for those great big brains.[77]

Here, Trout distinguishes between the general condition of the planet before modern humans, and the effect of the 'big brains' upon that condition. The term 'big brain' suggests a biological ground for this distinction, which is emphasised by the reference to 'overelaborate nervous circuitry'. But the reference to 'evils' that are seen and heard about 'simply everywhere' is suggestive of a particular account of human history. Indeed, this reference is illuminated by Trout's statement at the end of the novel that although the humans of the twentieth century were 'part of the clockwork of the universe', they 'no longer fitted in', and were instead 'damaging all the parts around them'.[78] This sense of humans no longer fitting in suggests that the 'evils' of human history – epitomised by the industrial modernity of 1986 – are damaging the planet in ways that anticipate Chakrabarty's description of geologic agency. The phrase 'clockwork' is particularly significant in understanding this vision, because it illustrates how Trout

imagines human biology and history as part of an intricate interaction of temporal and spatial systems that suggests an ecological consciousness on Trout's part. Although the metaphor of a clock or mechanism might superficially appear to render these systems as objects, Trout's assertion that humans were part of this mechanism suggests a Stengersian assemblage in which human and non-human components co-create a larger biosphere.

Yet Trout's account of how the humans of the late twentieth century no longer fit in with this 'clockwork' also suggests that Trout considers these humans as living in a way that is dangerously incompatible with this biosphere. Trout's understanding of this incompatible way of living is signalled in the above quote through his reference to the 'innocence' of the planet, which can be read as an appeal to a pre-lapsarian myth of a pristine Edenic nature. Leonard Mustazza has noted that the novel's emphasis on human knowledge and 'big brains' as a source of human troubles is reminiscent of the Fall in Genesis, where the 'knowledge of good and evil came at the expense of native innocence, dignity, and immortality'.[79] As we have already seen in previous chapters, allusions to the Biblical Fall provide literary fiction with ways of imagining the emergence of geologic agency and the anthropocentric separation of humans from nature. Trout's quasi-religious figuring of the 'innocent' planet as corrupted by the evil of the 'great big brains' associates the capacity for choosing between 'good and evil' with both the oversize human brain itself and the geologic agency that is damaging the 'clockwork' of the biosphere.

The association between the biological evolutionary condition of the human brain and human history is further illuminated elsewhere in the novel when Trout describes how one of the most 'diabolical' aspects of the 'big brains' was an intellectual and technological impulse to imagine and then carry out damaging activities.[80] Trout describes this impulse as follows:

> […] as though in trances, the people would really do it […] burn people alive in the public square for holding opinions which were locally unpopular, or build factories whose only purpose was to kill people in industrial quantities, or to blow up whole cities, and on and on.[81]

Although these examples of violence and destruction are not specifically environmental, they are industrialised. Moreover, they are clearly examples of the damage being done by humans to 'all the parts around them'. These examples are significant because they relate the human brain to collective acts of violence and destruction; Trout is not describing the pathology of a single individual but rather a collective pathology repeated by all individuals. The sense of repetition is underlined by the final phrase 'and on and on', which also suggests that this pathology is being repeated throughout history. The reference to 'trances' is particularly important in understanding the continuation of this destructive way of living, because it frames the destructive tendency as

something that the individual is not fully conscious of. There is a hallucinatory quality to the image of individuals performing these activities in 'trances' that implies an obfuscation of reality reminiscent of the re-thinking of Althusserian ideology examined earlier in this thesis. Indeed, these 'trances' seem to emphasise an imaginary relationship between the big brain humans and the 'reality' of the biosphere, in which humans perform acts irrespective of the larger consequences for the 'earthling' part of the 'clockwork'.

The Biological Insanity of the Human Subject

In associating the biological defects that Trout ascribes to the human brain with the events of human history that have culminated in the industrial modernity of 1986, the brain itself becomes a form of metonym for Trout. In this metonym, Trout uses the brain as a substitute for his account of multiple and related characteristics of humans. Not merely a biological attribute of *Homo sapiens sapiens,* for Trout the brain also stands in for the human intelligence through which contemporary cultures of modernity enact damaging actions upon each other and the biosphere, and for the ideological processes by which humans reproduce and obscure these destructive actions. And it is through this metonym of the brain that Trout calls attention to what he views as the historical and biological causes of what we might now describe as the Anthropocene. Indeed, his association between the big biological brains of 1986 and the historical 'evils' which have destructive and unsustainable anthropogenic consequences, establishes his vision of the human as both a biological and historical subject. This vision signals how Trout's narrative of a future evolutionary – and indeed ecological – history will simultaneously encompass both biology and history in its unfolding.

This vision is important for understanding how the text depicts the humans of 1986 through Trout's narration. Trout's understanding of how these humans are damaging the 'clockwork' might initially appear to be a straightforward assertion of moralistic fallacy, because Trout himself implies a more 'innocent' way of living that he specifically associates with a condition of perfect nature that preceded the metonymic 'big brain'. In this sense, he seems to appeal to nature in imagining an 'innocent planet' that appears legitimate precisely because it fulfils his own understanding of a pre-lapsarian nature. As we have just seen, Trout describes the ways in which the loss of this perfect nature is associated with the specifically human consequences of an imaginary relationship with the biosphere. This too suggests that there is a 'real condition' of this relationship – identifiable in a pristine 'nature' – to which one can look in order to understand what is 'good'.[82]

However the extent to which Trout appeals to nature in his account of the damaging effects of humans upon the biosphere is complicated by his vision of those humans as both

biological and historical subjects. This vision complicates such an appeal because rather than affirm that a biology found in nature is 'good', Trout's metonymic use of the 'big brain' associates that natural biology with something negative; namely the damaging human activities of human history. To appeal to nature would mean also appealing to this biology, and so to this history. Trout relays this apparent contradiction through a series of depictions of damaging human activity that he self-consciously frames as biologically natural consequences of the human brain. These episodes draw in particular upon an imaginative reworking of 'sanity' and 'insanity' to disrupt any reader expectation that 'what is good' is that which is found in nature.[83]

In a key example of this disruption, Trout specifically examines the sanity of Colonel Reyes, a Peruvian Pilot who launches a missile at Ecuador's Guayaquil International Airport, and in so doing initiates a war between the two countries. Trout muses on Reye's role in launching the missile and the way he experiences the launch, which both Reyes and Trout imagine as analogous to the male role in sexual reproduction. Yet Trout seeks to qualify this alarming contradiction between Reye's destructive actions and the creative metaphor of reproduction:

> And I worry now about skewing my story, since a few characters in it were genuinely insane, and giving the impression that everybody a million years ago was insane. That was not the case. I repeat: that was not the case.
>
> Almost everybody was sane back then, and I gladly award Reyes that widespread encomium. The big problem, again, wasn't insanity, but that people's brains were much too big and untruthful to be practical.[84]

There is an important distinction here between Trout's view of 'sanity' and 'insanity'. For Trout, 'sanity' is the normal functioning of a human brain. Reye's actions may seem insane when rendered by him as analogous to reproduction, but Reyes himself is sane when viewed within the context of the human brain being 'much too big and untruthful to be practical'. It is this brain that produces the 'trance'-like condition of humans acting upon their imagination. Although the reader is alerted to the absurdity of his actions by the contrast between Reyes' launching of a missile and his metaphor of the creation of new life, Reyes himself ignores the real outcome of his actions.

The classic aphorism that 'war is organised insanity',[85] an idea explored by Vonnegut himself in *Slaughterhouse 5* (1969), is inverted by Trout in this passage to assert the normalisation of industrialised warfare for humans. By contrast, Trout views insanity in terms of the human brain not functioning in the way that it has evolved to function. Such a brain disorder is exemplified by the dementia of the character Roy Hepburn, who believes himself to have been a soldier involved in nuclear testing that took place when he was still a child. This kind of insanity is

coded as a kind of harmless fantasy reminiscent of *Cat's Cradle*'s Bokononist concept of *foma*, in contrast to the destructive reality of human sanity.

Through these reflections on sanity and insanity, Trout begins to frame the normalising of destructive activities such as warfare as part of an evolutionary pathology within the 'big brains' of the human species. It is as a result of this pathology that the 'organised insanity' of warfare appears 'sane', and so can be said to become naturalised. Elsewhere in the novel, Trout examines this 'sanity' in specific relation to the exploitation of the biosphere. Recounting how a wealthy businessman called Andrew MacIntosh feigned concern for the ecological effects of unrestrained tourism on the Galapagos Islands, Trout declares that:

> It is a joke to me that this man should have presented himself as an ardent conservationist, since so many of the companies he served as a director or in which he was a major stockholder were notorious damagers of the water or the soil or the atmosphere.[86]

The 'joke' is that whilst MacIntosh comprehends the logic of conservationist concerns for the Galapagos ecosystem, he co-opts it for his own purposes. In so doing he ignores the damaging reality of his relationship with the biosphere in order to maintain his anthropocentric exploitation of that biosphere. Yet whilst Trout describes MacIntosh's personality as 'pathological',[87] he has already noted in an earlier passage that the businessman is 'greedy and inconsiderate, but not insane'.[88] Trout's assertion that MacIntosh is 'sane' frames the obfuscation of the real conditions of his existence as itself 'natural'. Trout therefore seems to suggest that none of this human activity is madness; on the contrary, MacIntosh's selfish desires and lack of genuine concern for the consequences of those desires are a defining characteristic of the big-brain.

This passage exemplifies Trout's view that a lack of concern for the finitude of natural resources, and the means by which this finitude is routinely obscured, is also an attribute of the humans of 1986 that is encompassed by his metonym of the 'big brain'. MacIntosh reproduces the exploitation of nature with no apparent concern for the inequalities it perpetuates or its ultimate sustainability. In his business interests, he is in effect reproducing an anthropocentric enframing of nature as an infinite resource. But rather than associate such reproduction with the interests of dominant political and economic structures, Trout's critique of 'sanity' attributes them to the human brain.[89] In this way, Trout ironically frames something damaging to the planet in a vocabulary that is positively coded as 'natural'. His diagnosis of 'sanity' implies something healthy and even perhaps 'good', but this implication of morality is undermined by the damaging reality that such 'sane' brains produce. There is a contradiction here between the big brain as 'sane' and as 'inimical to a healthy and happy humanity'[90] that suggests a self-conscious inversion

of the logic of appeals to nature, and which underlines how such appeals are in fact facile and misleading.

Trout's reflections on the sanity of the 'big brain' can therefore be understood as complicating the role of scientific descriptions of nature as a means of articulating how the human relationship with the biosphere should be organised. Indeed, we might say that Trout's narrative emphasis on the sane human brain highlights a difficulty in attempting to mobilise scientific knowledge claims about humans and the biosphere as a means of responding to anthropogenic climate change. Trout's concept of 'sanity' marks such a difficulty by underscoring the apparent contradictions that arise when seeking to provide a normative account of this relationship through a biological understanding of humans.

In these ways, Trout's account of the big brain humans of 1986 touches upon an apparent limit of scientific reasoning in intervening in the biosphere; that which science identifies in nature might not necessarily align with non-scientific understandings of what is 'good' – morally or otherwise. This difficulty is particularly important when considering the role of science in shaping how the human relationship with the biosphere is thought about in the Anthropocene, because the uses to which scientific knowledge is put in responding to anthropogenic climate change proceed from specific decisions about how to interpret and make use of that knowledge. Thinking about this relationship in scientific terms seems to mean thinking about an essential biological species history, but doing so also means ignoring the historical contingencies – and global inequalities – through which the modernity of 1986 that Trout describes has actually come to exist. Chakrabarty gestures towards this problem when he notes a discontinuity between the 'historians' thinking' that emphasises historical contingency – in which humans are regarded less as a species and more as a series of self-constituted cultures – and the scientists who, in describing the Anthropocene, argue for a view of humans as a 'particular kind of species' that is able to acquire 'geologic force'.[91]

In seeking to reconcile these positions, Chakrabarty reminds us that evolutionary science does not in fact necessarily imply 'essentialist terms' for species.[92] This perspective suggests that evolutionary science can actually accommodate the contingencies of human history that have produced and now include the Anthropocene. But crucial to this perspective is the need Chakrabarty highlights to simultaneously consider such history in geologic as well as human terms. As we shall now see, it is precisely this simultaneous imagining of geologic and human history that *Galapagos* encourages us to think through and beyond. Key to this imagination is the vast temporality of the evolutionary narrative over which Trout's view of humans is presented: a fictional geologic future that provides a self-consciously fictional speculative account of how the big brains might 'become with' the 'clockwork' of the biosphere. It is through this shift in perspective provided by the *longue durée* of the novel's future history that the text unlocks a way

of thinking about the humans of 1986 within a properly geologic view of history, and of thinking through how both these humans and the fisherfolk have been co-created by the human and biologic histories of the Anthropocene.

Trout's *longue durée:* A Future Species History of Humanity

Trout's narration of this future history relays how a small group of humans – including several of the novel's main characters – escape the civil turmoil of a global economic crisis and impending war only to be marooned on the fictional Galapagos island of Santa Rosalia. Shortly afterwards an infertility pandemic sweeps across the world. After a century or so the rest of humanity has died out, but the small group on Santa Rosalia produce children. This isolated human population becomes the progenitor of all future humans. They evolve over the subsequent million years into fur-covered semi-aquatic mammals with much reduced intelligence. Trout specifically identifies this transformation with specific evolutionary and ecological forces:

> Those with hands and feet most like flippers were the best swimmers. Prognathous jaws were better at catching and holding fish than hands could ever be. And any fisherperson, spending more and more time underwater, could surely catch more fish if he or she were more streamlined, more bulletlike – had a smaller skull.[93]

Evolutionary forces have shaped the descendants of the survivors so that their physiology has become better adapted to the ecological niche they inhabit, which in this case happens to be the Galapagos Islands. It is because of these 'modifications to the design of human beings', principally this reduction in brain capacity necessitated by the smaller skulls, that Trout can conclude in this future that there is no reason why the 'earthling part of the clockwork can't go on ticking for ever'.[94] This statement is in stark contrast to his preceding assessment of the 'earthling part of the clockwork' in which the humans of 1986 'are damaging all the parts around them'.[95] This contrast underlines Trout's view that the fisherfolk are better suited to continued existence on planet Earth than the humans of 1986. In this way, the evolution of the fisherfolk challenges the stability of the separation of the human from the biosphere that is implied by the 'no longer fitting in' Trout identifies with 1986, and appears to offer the fisherfolk as an outcome that reintegrates the human species within the biosphere.

But Trout's allusions to evolutionary science also contain an important subtext. In referring to the fisherfolk as 'folk', or in this particular quote as 'fisher*people*', Trout's evolutionary perspective challenges a view of humans as a static biological species. The fisherfolk

are not *Homo sapiens sapiens*, yet he also implies that they are still 'people'. This sense of continuity with the category of 'people' suggest that Trout views the condition of being human as one that exists beyond a fixed or homogeneous scientific classification of the 'big brained' modern human; beyond, indeed, his own metonym of the big brain itself. Humans are instead framed as a species in the full historical and biological sense: constituted of individuals with varied physical and mental traits that are collected under taxonomic headings rather than being prescribed by them, and subject to an on-going process of evolution. This perspective is underlined by Trout's description of how hands became flippers and skulls became streamlined. Trout's concept of how the fisherfolk and the humans of 1986 do or do not fit in with the 'clockwork' of the biosphere is therefore framed by an idea of the 'human', or at least the 'person', that transcends the narrow delimiters of either a particular point in geologic history or a particular system for categorising nature.

To make sense of Trout's interpretation of this evolutionary change it is important to recognise how the novel calls attention to evolution and ecology through numerous references to Charles Darwin. The setting of the eponymous Galapagos Islands is the most overt reference, as it was during an expedition there in 1835 that Darwin observed the dramatic speciation in animals on different islands that led him to formulate what would later become his theory of natural selection. The name of the ship upon which the survivors escape Ecuador is the *Bahía de Darwin* ('Darwin Bay'), which is also the name of a geographical feature named after Darwin on the Galapagos island of Genovesa. The fisherfolk therefore evolve at the site of speciation most closely associated with Darwin, after their ancestors arrive there on a ship bearing his name.

These references to Darwin signal both the generally evolutionary scale of the novel's future history and what appears to be a particular Darwinian interpretation of that history by Trout. For Trout, this evolutionary intervention delineates the end of the 'era of big brains'[96], but not the end of 'people'. This distinction is important because it complicates the essentialist species thinking that Chakrabarty has noted underpins a 'fear' of the 'idea of species' among historians.[97] In seeking to counter this fear, he notes Daniel Lord Smail's observation that Darwin did not view species as 'fixed entities with natural essences' and that attempting to identify a homogenized 'nature and body type', or even to identify a singular 'human nature' is futile.[98] Such futility might also be apparent in Trout's metonymic use of the human brain to suggest an essentialist view of the humans of 1986, whose geologic agency was biologically determined. Yet Trout's figuring of the fisherfolk as people complicates this view by depicting humans as mutable entities in geologic time. In this way, Trout's perspective over the novel's future history signals a suspicion of essentialist constructions of the 'human' as a fixed species, precisely because he is able to trace the evolution of the human across geologic history. This tracing marks a Darwinian ecological insight of the kind called for more recently by Timothy Morton; Trout is here expressing

what it 'feel[s] like to understand evolution […] to admit the world of mutation and uncertainty that Darwin opens up'.[99]

In addition to these specifically Darwinian subtexts, Trout's account of 'mutation and uncertainty' in this future evolution also points towards a symbiogenesistic evolutionary narrative. In this narrative, the humans of 1986 become the fisherfolk through a complex interaction of other biologies (the infertility bacterium), planetary topography (the geographical isolation of the Galapagos islands) and the human history of industrial modernity that brings the particular group of survivors to the islands. The evolutionary narrative Trout describes therefore takes place at both the micro-level of human history and the macro-level of a geologic history sensitive to the complex biosphere. One example that connects these levels is Trout's account of how the dropping of the atomic bomb on Hiroshima in 1945 influenced the eventual evolution of the fisherfolk:

> […] an American named Paul W. Tibbets […] had dropped an atomic bomb on Hisako Hiroguchi's mother during World War Two. People would probably be as furry as they are today, even if Tibbets hadn't dropped the bomb. But they certainly got furrier faster because of him.[100]

This passage is a typical example of the Vonnegutian concern for complex causality and what Heise describes as 'connections between events at vastly different scales'[101] – connections that were also identified in the earlier discussion of *Cat's Cradle*. The human history of World War Two and nuclear weapons, and the evolutionary transformation of the human species into fisherfolk over geologic history, are here entwined in a collision of coincidence and biology. Hisako is the first person born on Santa Rosalia, and is also the first to be covered in fur. Although Trout speculates that fur may have eventually arisen as an evolutionary adaption over time anyway, the interdependencies of the human history of modernity and of geologic history are both imaginatively encompassed by this account; the big brain produced the atom bomb, but the atom bomb ultimately contributed to the evolution of the fisherfolk. What this encompassing reveals is a subtle nuancing of Trout's critique of the historical position of the 'big brain' in relation to the biosphere's 'clockwork'. The big brain of the 'sane' humans of 1986 may well be an aberration when viewed solely from the perspective of human history. But when viewed across geologic time, this aberration – and the complex historical contingencies that it produces and which produce it – appears as a part of the unfolding of the fisherfolk's evolution. Trout's account of this evolution frames the fisherfolk as occupying an evolutionary moment within a continuous history of mutable and heterogeneous 'humans' in which the boundaries between human history and geologic species history collapse. In this sense, the novel draws out some of the redemptive

potential of the evolutionary and ecological sciences discussed above, because it is through the insights of these sciences that Trout's account becomes possible.

The Ghostly Narrator: Bringing Together Geologic and Human History

At the same time, it is also through Trout's fictional narrative that these evolutionary and ecological insights themselves become thinkable in a particularly literary way. Trout's view of the *longue durée* of geologic history is clearly central to the novel's collapsing of historical boundaries and the relaying of the complex interdependencies of human, biosphere, and fisherfolk that are made possible by evolutionary and ecological science. But it is significant that the novel renders this perspective through the literary device of Trout's presence in the text as a 'ghost'. It is as this 'ghost' that Trout's narration appears to transcend the finitude of human history after the collapse of modernity and the evolution of the fisherfolk. This historical transcendence is mirrored by his own claims of a material transcendence, through which he is able to

> […] read minds, to learn the truths of people's pasts, to see through walls, to be many places all at once, to learn in depth how this or that situation had come to be structured as it was, and to have access to all human knowledge.[102]

These powers suggest that Trout is omniscient; we might even view this passage as a typically Vonnegutian metafictional joke about omniscient narrators. But this perspective also registers Trout's own consciousness of how his narration appears to transcend the limitations of conventional anthropocentric narratives of human history in which the biosphere serves merely as a backdrop to the unfolding of modernity. It is by being 'many places at once' and learning the causes and effects through which 'this or that situation came to be' that Trout is able to articulate the complex 'connections between events at [the] vastly different scales'[103] of geologic history. In this way, the text de-privileges the human history and biology of 1986 that Trout elsewhere encompasses with the metonym of the human brain; instead, Trout's apparently transcendent position as a ghost provides a perspective in which this brain is imagined as only one moment in a larger narrative of geologic history.

In this respect, Trout's ghostly narrative perspective anticipates both Morton's sense of the 'thinking big' of ecological thinking about the mesh – in which ecological 'knowledge means we lose touch with reality as we thought we knew it'[104] – as well as Richard Klein's recent call for a future historical perspective on the 'end of organised existence'.[105] In Klein's account, such a perspective would need to take account of '[…] a certain future that is supposed to have already

taken place—as if we had actually alighted in some far future in order to view that future as past'.[106] Trout's position beyond the end of human history may seem to embody the 'future historian'[107] Klein proposes. Indeed, the correspondence between Trout's 'ghostly' condition as a narrator and Klein's comment that in trying to imagine what lies 'beyond the human species', we must 'assume the condition of ghosts, between life and death'[108] is almost uncanny. In Klein's argument, the ability to speak about a future end of human history as if it were history is crucial for articulating the consequences of the both nuclear war and climate change. I would suggest then that Trout's 'ghostly' position demonstrates how this narrative and generic technique of fiction can help the reader to imagine the end of human history's 'organised existence', and so also imagine a geologic history 'beyond the human species' in a particularly productive way.

An example of this technique is evident when Trout imagines himself as 'criticizing human bodies as they were a million years ago, the kind of body I had, as though they were machines somebody intended to put on the market'.[109] This image of Trout standing outside of himself and critically appraising his own body as if it were a commercial product could be understood as a drily comic literalisation of the anthropocentric enframing of nature – in this case the human body itself – as a resource.[110] But this passage also draws particular attention to the apparent physical and historical transcendence that a 'ghostly' condition entails. It is by standing outside of his own biology as a ghost and outside of human history as an observer from a million years in the future that Trout claims to transcend the limited historical perspectives of the reader. This claim to transcend human biology and history – to transcend the evolutionary moment of the big brain – illuminates his subsequent assertion that not only are human brains 'much too big to be practical', but 'Something is always going wrong with our teeth'.[111] The evolutionary solution to this dental problem is just as unexpected as his critique of the big brains: 'the Law of Natural Selection […] hasn't made teeth more durable. It has simply cut the average human life span down to about thirty years'.[112] The implication that the lifespans of modern humans are too long challenges the assumption that a longer life is an inherently good thing. But more importantly, this account of how evolution has 'taken care of the tooth problem'[113] foregrounds the relatively transitory nature of the humans of 1986 within the sweep of evolutionary history. Again, Trout's account here is evolutionary in its insight. By re-imagining the human position within the biosphere as that of an unstable and provisional species whose biological condition is not fixed, Trout proposes a view of history in which the end of 'organised existence' beyond the 'human species' is less an ending in the absolute sense and more part of an on-going transition. This view of history disrupts the repetition of a discrete category of the 'human' as a stable subject within geologic history. Instead, the human begins to appear as an entity that has become with the biosphere in the unfolding of geologic and human histories.

This view of history – which Trout's ghostly condition enables – is exemplified towards the end of the novel when Trout reflects that his narrative has described 'the events and circumstances crucial, in my opinion, to the miraculous survival of humankind […] queerly shaped keys to many locked doors, the final door opening on perfect happiness'.[114] The 'events and circumstances' are the sum total of the many historical contingencies – human and geological, as well as ecological and evolutionary – upon which the emergence of the fisherfolk has depended, but it is significant that he describes these as 'queerly shaped keys'. I would suggest that this phrase refers not only to the unpredictable and often coincidental nature of these events – a sentiment that echoes Jonah's account of *karass* – but also to the heterogeneity of the individuals who have participated in them. Hisako's 'fur' is perhaps the most graphic example of how the future human evolution that takes place on *Santa Rosalia* is a product of a collection of humans who are not 'fixed entities with natural essences' but rather fluid and unpredictable; her biology is the result of modernity and environment as well as genetics. Other examples of heterogeneous components that co-create the evolution of the fisherfolk include the millionaire 'Captain' of the *Bahía de Darwin*, who has a 50/50 chance of having inherited a degenerative brain condition and becomes the unwilling father of the first child born on the island, and MacIntosh's daughter, who has inherited blindness but chooses not to have children. These varied biological and genetic components find expression in the future evolution of the fisherfolk through these individuals' isolation on the island, which is itself is a consequence of a global financial crisis and the infertility pandemic. By highlighting the relative influence of the biologies and historical positions of these individuals upon the future development of the fisherfolk, Trout's transcendent perspective draws attention to how both evolutionary and historical chronologies are entwined. Indeed, I would suggest that Trout's account of the 'queerly shaped keys to many locked doors' underlines the text's fictional attempt to think simultaneously about both chronologies. Through these 'keys', the text unlocks a way of thinking through how that which we call 'human' – the survivors on the island and the fisherfolk – emerge from an interdependent entanglement of human history and the geologic history of the biosphere. This emphasis on complex and interdependent historical and biological co-creation appears to parallel the symbiogentic 'becoming with' described by Haraway, the 'entanglement' referred to by Stengers, as well as the ecological mesh described by Morton. And it is the very transcendent 'ghostly' perspective of Trout in unfolding the novel's future geologic history that assists the reader in thinking through this 'becoming with' of entities that both create and are created by the biosphere.

After the Anthropocene: The Hoped for Apocalypse of the Fisherfolk

In this way, we can understand Trout's apparently transcendent narrative position as providing a particularly imaginative way of thinking about the relationship between humans and the biosphere that, like the 'scientific story' of the Anthropocene, intrudes upon the dominant story of modernity. This intrusion is valuable because, by providing a means of thinking through human and geologic histories simultaneously, it imaginatively discloses some of the key insights of evolutionary and ecological science. These insights disrupt the artificial separation of human and biosphere maintained by the anthropocentric foundations of ideology. But Trout's narrative also points towards a further implication of what this thinking means in terms of how scientific knowledge might be instrumentalised to provide solutions to the pressing context of anthropogenic climate change; namely the specific and selective ways that Trout makes use of such knowledge. Trout's account of the future history of the fisherfolk is framed by him as heralding the end of the era of the 'big brain', both biologically and in terms of the damaging activities that Trout's metonym encompasses. In that sense, this history might also be understood as marking an end of the Anthropocene. Trout certainly suggests something like this when he declares that the 'earthling part' of this clockwork may 'go on ticking for ever'[115] in the era of the fisherfolk. This apparently naturalistic end to the Anthropocene is quite distinct from each of the apocalyptic endings we have considered previously in this thesis. I would suggest that by emphasising how this end unfolds as a consequence of the unstable and mutable category of the 'human' evolving over geologic time, Trout's narrative can be re-read as a challenge to the promises of science to explain – and technology to provide – a solution to anthropogenic climate change.

Despite his cynicism towards the big-brained humans of 1986, Trout appears to have always maintained a particular belief in the futurity of humans. This belief is specifically articulated at the end of the novel when Trout encounters his dead father Kilgore and discusses why Trout chose to remain on Earth as a ghost for a million years. Kilgore declares that Trout believes 'that human beings are good animals, who will eventually solve all their problems and make earth [*sic*] into a Garden of Eden again'.[116] This sentence underlines humanity's condition as a species of animal, and suggests that Trout has been hoping for a future in which these human animals regain the pre-lapsarian condition of innocence that preceded the era of the 'big brains'. This sense of hope is further underlined by the famous quote from Anne Frank that 'in spite of everything, I still believe people are really good at heart', [117] which forms the epigraph to *Galapagos*. Trout himself draws attention to the use of this quote as an epigraph to 'this book' immediately before the statement by his father. Like the Bokononist epigraph to *Cat's Cradle*, this self-referential use of the epigraph highlights the text's fictional status and emphasises the role of

Trout as the first person narrator. But this openly self-referential moment also alerts us to the significance of Kilgore's statement for understanding Trout's narrative. Trout's account of a future history describes what he views as a solution to humanity not 'fitting in' to the 'clockwork' of the universe. It was from failing to fit in that humanity was 'damaging all the parts around them',[118] including the damage to the biosphere that we now associate with the Anthropocene. Trout is therefore offering his evolutionary narrative of the fisherfolk as a successful outcome of human species history.

Although we have seen how this history is entwined with the history of industrial modernity in the future history of the novel, it is not itself a product of what Chakrabarty might describe as scientific 'reason'. Rather, Trout has relayed how humans have fortuitously evolved into this condition of 'perfect happiness' through a complex evolutionary process of co-creation that marks the end of the *Homo sapiens sapiens* of 1986. They have not been guided out of the Anthropocene by technological solutions, nor by a scientific understanding of the human relationship with the biosphere. Indeed Trout's account of the fisherfolk's brains provides a particular challenge to the promise of scientific reason as a means of responding to the Anthropocene. As previously discussed, Trout's representation of the fisherfolk emphasises how he views them as still human, but freed from the 'fatal' defect of the 'big brain'. This view is emphasised by his claim that because of their 'decreased brainpower, people aren't diverted from the main business of life by the hobgoblins of opinions anymore'.[119] Trout's use of the word 'opinions' in this section refers to what he describes shortly afterwards as the '*magical*' transformation by which Charles Darwin changed the status of the Galapagos islands from 'worthless' to 'priceless' by changing peoples' opinion of them.[120] This transformation suggests an anthropocentric enframing of the natural resources of the island by both science and the market, which changes the way that people understand them. Like the ideological 'trances' of the big brain discussed earlier, Trout's description of this 'magical' process seems to emphasise an imaginary relationship with nature that complements the re-thinking of ideology proposed in previous chapters.

Trout's comment about decreased brainpower liberating humans from the 'diversion' of these 'opinions' must be understood in the context of his use of the brain as a metonym for, amongst other things, human reason and intelligence. By depicting the fisherfolk as liberated from the diversions of these imaginary relationships by virtue of their reduced brain capacity, Trout's account of this post-human condition encourages readers to consider whether humans would actually survive better and even be 'happier' without the mental capacity to technologically or scientifically enframe nature as a resource for exploitation. Such a proposition is a familiar motif in the science fictional tradition of long future histories, from Wells' *The Time Machine* (1895) to Aldiss' *Hothouse* (1962). Where the 'intellectual degradation' of Wells' Eloi is described

by the Time Traveller as a consequence of the ultimate conquest of human intelligence over nature,[121] Aldiss' later novel specifically addresses human intelligence as an accidental aberration that does not ultimately benefit humanity.[122] In this sense, both *Hothouse* and *Galapagos* challenge what might be described as the post-enlightenment promises of scientific and technological advancement that imply that such advancement is beneficial to humanity. This is the same faith that was represented in *Cat's Cradle* by Dr Breed, and also in Ballard's *The Drowned World* by the fictional UN.

Trout's depiction of the co-creation and future post-human condition of the fisherfolk can therefore be understood as a challenge to enlightenment assumptions of progress that underpin a faith in technoscience – science, technology, and the social contexts in which they are bound – to intervene in the biosphere. This challenge is brought into particular focus in *Galapagos* by what Robert Tally describes as the narrative's 'optative' apocalyptic mood.[123] Tally notes that Vonnegut seems to 'overcome [the] misanthropic humanism' seen in his other novels, 'not by abandoning the *mis-* in misanthropy but by abandoning the *anthropos*'.[124] The extinction of contemporary humans is embraced 'with a sense of hope and futurity that one normally associates with a utopian promise'.[125] Tally calls this approach an 'apocalypse in the optative mood': an apocalypse that he claims the novel embraces precisely because it heralds the end of human intelligence.[126] Trout certainly casts the future history he narrates in an optative mood; his overt admiration of the post-human life of the fisherfolk and his belief that this life also conserves the life of the biosphere is epitomised in the assertion that 'the earthling part of the clockwork' can now 'go on ticking for ever'.[127] Trout's desire for this particular ordering of human life in relation to the biosphere reveals how he understands his own narrative as offering a solution to the 'evils' that marked industrial modernity in the era of the big brain. For Trout, the only truly successful intervention to these evils is ultimately a 'hoped-for' biological and historical regression from such modernity.

Staying with the Trouble: The Limits of Trout's Transcendence

Does Trout's interpretation of the fisherfolk therefore suggest that we read *Galapagos* as a novel of 'apocalypse in the optative mood',[128] as Tally seems to suggest that we should? Such a reading implies that the novel's main concern is to affirm a particular way in which humans should live within the biosphere – a way that Trout lays claim to through his particular and selective use of evolutionary science to explain the fisherfolk. But some of the open questions that now surround the Anthropocene would suggest caution here. In particular, Stengers' concern that the Anthropocene might legitimise an anthropocentric impulse to think 'ultimate thoughts about Man, far, far away from the sordid situation we have created for ourselves'[129] suggests that we

should also be wary of Trout's apparently transcendent position as arbiter of the species history of humanity – and his apparent instrumentalisation of evolutionary science as a way of offering a solution to the damaging outcomes of industrial modernity – lest we overlook the particular historical perspectives that nevertheless mark his narrative. Such ultimate thoughts are apparent in Trout's belief that the fisherfolk have achieved a 'perfect' biological condition, and suggest the kind of 'metaposition' of 'ecological pronouncements'[130] that Morton contends should be subverted by narrators in a new 'ecological aesthetics' that he proposes.

Yet despite Trout's apparent transcendency, the novel also reminds us how his narrative remains grounded in his own specific – and historically selective – mobilisation of evolutionary science. The specificity of Trout's mobilisation of this science is evident in the way that the 'perfect happiness' of the fisherfolk also implies a particularly sustainable – and surprisingly static – relation between humans and the biosphere. This relation appears to embody the 'optimal physical and chemical environment for life on this planet'[131] that James Lovelock describes in his 'Gaia hypothesis'. The evolution of the fisherfolk can be seen in this light as an allegorical rendering of one of the most infamous aspects of Gaia; their co-creative emergence through the 'queerly shaped keys to many locked doors'[132] is suggestive of a Gaia-like re-balancing of the 'clockwork'. Yet in describing this outcome as 'perfect happiness', Trout effectively naturalises a very particular and non-scientific interpretation of the otherwise scientifically described fisherfolk. By attesting to an idealised final condition, the 'perfect happiness' of the fisherfolk ironically ignores the very narrative of complexity and transition that precedes it. Instead, Trout's narrative concludes with a final 'appeal to nature' in which the mutable transitions of evolution cease before the valorised condition of the fisherfolk. In this way, Trout's 'hoped-for' apocalyptic end to the Anthropocene somewhat paradoxically puts evolutionary and ecological knowledge to use in asserting a normative vision of how human beings, in the form of fisherfolk, *should* live upon the Earth.

It is in drawing attention to the limits of Trout's supposedly transcendent perspective that *Galapagos* alerts the reader to the dangers of this normative use of science. We are reminded that Trout is, after all, himself a form of post-human human. In spite of his claims to transcend the limited historical perspectives of the reader, Trout's position as a ghostly narrator is not straightforwardly transcendent. Even as a ghost, he retains a consciousness that was formed by the experiences of his lifetime during the specific historical context of the late twentieth century. Examples of this consciousness can be found in the passages in which he evidences his critique of the 'big' human brain by recounting his experiences as a US Marine during the Vietnam War. In one particular example he sarcastically 'thanks' his big brain for advising him to volunteer.[133] Trout describes this example as a 'personal note', and in so doing draws attention to how his own

account of the big human brain is itself framed by his experiences at specific historical moments during which he himself possessed such a brain.

Peter Freese has suggested that the novelistic form of Galapagos further undermines Trout's transcendence. In particular, Freese suggests that Trout's claim to be writing the novel 'in air – with the tip of the index finger of my left hand, which is also air […]'[134] is complicated by the presence of the novel itself. Freese criticises Trout's narrative claim as a 'verbal game built on the very premise of its own impossibility' that 'denies its constitutive thesis by storyfying it'.[135] This reading suggest that Trout's claimed transcendence is contradicted by the very way in which the novel itself uses narrative and story to examine a future supposedly beyond narrative and story. But as Freese also implies, Trout's claims of transcendence are themselves metafictional, and this reminds us that we are in fact reading a novel in which Trout is a narrator. Indeed, when Trout describes himself as 'scribbling away like Father', [136] a reference to his science fiction writing father Kilgore, he reminds us that the novel is a book written by Vonnegut that mobilises science fictional generic resources such as a future history and the imaginary representation of science. Vonnegut's self-conscious use of a first-person narrator in this way highlights how the text is a form of imaginative storytelling in which the textual reality of its future history has been constructed by a 'ghostly' example of the same 'big brain' that Trout criticises. By reminding us of this, Vonnegut also foregrounds the fact that Trout's apparently transcendent view of history is still dependent upon his fictional human mind in order to produce the narrative interpretation of that history.

It is by drawing attention to the human origins of Trout's mind that the novel registers the limitations of his instrumentalisation of evolutionary science and underscores how this instrumentalisation proceeds specifically from Trout's moral decisions concerning how to make use of such knowledge. Consider again the statement made by Kilgore Trout concerning his son (italics mine): 'You *believe* that human beings are *good animals*, who will eventually solve all their problems and make earth [*sic*] into a *Garden of Eden* again.'[137] Kilgore's statement summarises Trout's belief that human destiny lies in the recuperation of that most original vision of anthropocentrically enframed natural resources; the Garden of Eden. For Trout, this belief is predicated on a potential for 'good' and anticipates the promise of a return to an Edenic bliss that he frames in terms of both moral and ecological redemption. However, Kilgore's use of the term 'good animals' implies a moral evaluation of humans at the same moment that it frames them as animals. This is an anthropomorphic misuse of language that constitutes an appeal to nature – specifically a moralistic fallacy – in the repetition of the moral appellation of 'goodness' in reference to a category (animals) that it does not support. In using this term in relation to his son's view of humans, Kilgore draws attention to how Trout's account of humans and fisherfolk is framed by a moral language; his suggestion that this evolutionary history leads to an ecological

condition of 'perfect happiness'[138] can also be read as a moral parable. Although not a scientist, Trout makes use of the insights of evolution and ecology as a means of legitimising his account of both the 'fatal' evolutionary defect of the 'three-kilogram brain' and the solution to this defect represented by the evolution of the fisherfolk that fulfils the human potential to be 'good' animals. In this sense, we can see that Trout's 'belief' in what humans *should* be is ultimately naturalised by a facile 'appeal to nature' that finally undermines his transcendent evolutionary view of history.

The religious allusions of Kilgore's statement and the beliefs of Trout to which it relates are therefore important. They alert us to how Trout's narrative account of the fisherfolk is grounded in a misleading instrumentalisation of evolutionary science that is underpinned by his 'belief' in a particular understanding of a human relationship with the biosphere. Despite his claimed transcendence, this belief repeats an appeal to nature as a means of legitimising Trout's view of the fisherfolk. Rather than present a problem with the internal logic of the novel however, as Freese appears to conclude it does, I would suggest that the foregrounding of the limits of Trout's claimed transcendence is critical to the text's critique of the very misuse of scientific knowledge that Trout himself is guilty of. Trout's future history helps the reader to think through the insights of evolutionary science and ecology that elucidate the ways in which the 'human' is neither a fixed nor universal subject occupying a discrete biosphere. By giving voice to these insights – by helping to make them thinkable – the novel embodies fiction's capacity to 'question reality' as we have become accustomed to perceiving it. [139] But the novel also highlights how Trout's narrative is misleading in its claims to an ultimate answer, and its attempts to provide a universal solution to the open questions of how human beings should live within that biosphere. By drawing attention to this misleading claim to an ultimate understanding of the human relationship with the biosphere, the novel forecloses the moralistic fallacy that the fisherfolk are 'good' and represent an ultimate condition of 'perfect happiness'. Such a conclusion is contrary to the on-going 'becoming with' of heterogeneous human subjects within an indifferent biosphere that evolutionary science and ecology suggest.

Through this self-conscious marking of its own narrative limitations, Vonnegut's fictional imagining of evolutionary science in *Galapagos* traces the boundaries of science's capacity to articulate an understandable human relationship with the biosphere, and like his ironic depiction of a scientist in *Cat's Cradle*, to meaningfully intervene in that biosphere. In the contemporary era of anthropogenic climate change, Trout's narratory contention that the post-human condition of the fisherfolk provides an evolutionary solution to humans no longer 'fitting in' to the 'clockwork' of the biosphere encourages readers to think through the implications of scientific accounts of ecology and evolution; to acknowledge what these accounts can do, can't do, and what they might 'stop'. The *longue durée* of his narration presents a complex synthesis of the geologic

history of human evolution and the human history of modernity that can now be understood as a way of thinking with the contemporary consciousness of the Anthropocene, whilst also acknowledging the limits of Trout himself to mobilise evolutionary science as a means of understanding the human relationship with the biosphere. It is Trout's story of the future geologic history of the fisherfolk that complicates and intrudes upon the dominant anthropocentric history of industrial modernity, and which encourages the reader to consider all human history as a process of 'becoming with' the biosphere. But whilst it is precisely Trout's capacity to mobilise evolutionary science in this way that enables him to relate and make sense of his narrative, this account is insufficient without the accompanying narrative presence of Trout's own limitations. This presence allows the novel itself to avoid instrumentalising evolutionary science as a way of describing an intervention in the biosphere, whilst simultaneously drawing attention to the anthropocentric limitations of asserting a transcendent view of that biosphere; the dangers of seeking to think – as Stengers puts it – 'ultimate thoughts about Man'.[140]

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[1] Isabelle Stengers, 'Gaia, the Urgency to Think (and Feel)', *The Thousand Names of Gaia, From the Anthropocene to the Age of the Earth*, (2014), p. 9 <https://osmilnomesdegaia.files.wordpress.com/2014/11/isabelle-stengers.pdf> [accessed 25 January 2015].
[2] Chakrabarty, 'The Climate of History: Four Theses', *Critical Inquiry,* 25 (Winter 2009), 192-222 (p. 211).
[3] Chakrabarty, 'The Climate of History: Four Theses', p. 211.
[4] For example, Alex Goody describes the novel as satirizing the Cold War arms race; see Alex Goody, *Technology, Literature and Culture* (Cambridge: Polity Press, 2001), p. 101. Terry Southern, who wrote the screenplay for *Dr Strangelove*, described the novel as a fantasy of the 'playful irresponsibility of nuclear scientists'; see Terry Southern, 'After the Bomb, Dad Came up With Ice', New York Times, 3 June 1963 <https://www.nytimes.com/books/97/09/28/lifetimes/vonnegut-cat.html> [accessed 20 January 2016]. Patrick O'Donnell summarizes the novel as 'satirizing a Cold War that produced such "policies" as MAD'; see Patrick O'Donell, *The American Novel Now: Reading Contemporary American Fiction Since 1980* (Chichester: Willey-Blackwell, 2010), p. 29.
[5] Kurt Vonnegut, *Cat's Cradle* (London: Penguin, 2008), p. 192.
[6] Vonnegut, *Cat's Cradle*, p. 193.
[7] Vonnegut, *Cat's Cradle*, p. 36.
[8] Vonnegut, *Cat's Cradle*, p. 30.
[9] Vonnegut, *Cat's Cradle*, p. 35.
[10] Vonnegut, *Cat's Cradle*, p. 29.
[11] Vonnegut, *Cat's Cradle*, p. 29.
[12] Vonnegut, *Cat's Cradle*, p. 29.
[13] Vonnegut, *Cat's Cradle*, p. 13.
[14] Roslynn Haynes, 'From alchemy to artificial intelligence: stereotypes of the scientist in Western literature', *Public Understanding of Science*, 12 (2003), 243-253 (p. 243).

[15] Cyndy Hendershot, 'The Atomic Scientist, Science Fiction Films, and Paranoia: *The Day the Earth Stood Still*, *This Island Earth*, and *Killers from Space*', *Journal of American Culture*, 20 (Spring 1997), 31-41 (p. 31).
[16] Vonnegut, *Cat's Cradle*, p. 1.
[17] Vonnegut, *Cat's Cradle*, p. 1.
[18] Mark Wekander Voigt, 'Kurt Vonnegut's Novel *Cat's Cradle*: Science Fiction, Thought, and Ethics', *Revista Umbral*, 1 (September 2009), 254-266 (p. 256) <http://repositorio.upr.edu:8080/jspui/bitstream/10586/98/3/Cat%20s%20Cradle.pdf> [accessed 20 January 2016].
[19] Voigt, p. 256.
[20] Voigt, p. 256.
[21] Voigt, p. 256.
[22] Vonnegut, *Cat's Cradle*, p. 1
[23] Although Jonah does state that he does not 'intend that this book be a tract on *behalf* of Bokononism (p. 4, italics mine), he does frame it as written in the mode of Bokononism by his distancing of the 'Christian book' that *The Day the World Ended* was supposed to be.
[24] Vonnegut, *Cat's Cradle*.
[25] Vonnegut, *Cat's Cradle*, p. 2.
[26] Vonnegut, *Cat's Cradle*, p. 180.
[27] Robert Tally, *Kurt Vonnegut and the American Novel: A Postmodern Iconography* (London: Continuum International Publishing Group, 2011), p. 15.
[28] Vonnegut, *Cat's Cradle*, p.34.
[29] Vonnegut, *Cat's Cradle*, p. 34.
[30] Vonnegut, *Cat's Cradle*, pp. 34-5.
[31] Vonnegut, *Cat's Cradle*, p. 36.
[32] Ursula K. Heise, *Sense of Place and Sense of Planet: The Environmental Imagination of the Global* (Oxford: Oxford University Press, 2008), p. 205.
[33] Heise, p. 205.
[34] Isabelle Stengers, 'Reclaiming Animism', *e-flux*, 36 (2012) < http://www.e-flux.com/journal/reclaiming-animism/> [accessed 24 January 2015]. Stengers is drawing upon the Deleuzo-Guattarian concept of assemblage.
[35] Timothy Morton, *The Ecological Thought* (Cambridge, MA: Harvard University Press, 2010), pp. 28-38.
[36] Vonnegut, *Cat's Cradle*, p. 29.
[37] Steven Shapin, 'Science and the Modern World', in *The Handbook of Science and Technology Studies*, ed. by Edward J. Hackett, Olga Amsterdamska, and Michael E. Lynch, 3rd edn (Cambridge, MA: MIT Press, 2007), pp. 433-48 (p. 443).
[38] Heise, p. 205.
[39] Timothy Clark, 'Derangements of Scale', *Telemorphosis: Essays in Critical Climate Change*, ed. by Tom Cohen and Henry Sussman (Ann Arbor, MI: Open Humanities Press, 2012) <http://dx.doi.org/10.3998/ohp.10539563.0001.001>.
[40] Vonnegut, *Cat's Cradle*, p. 193.
[41] Chakrabarty, 'The Climate of History: Four Theses', p. 219.
[42] It is worth noting that despite the 'geological' language of 'Anthropocene', the term first emerged from the ecological study of freshwater diatoms and their interactions with an environment being altered by human activity. See Donna Haraway, *Anthropocene, Capitalocene, Chthulucene: Staying with the Trouble*, online video recording, Vimeo, 8 June 2014, <https://vimeo.com/97663518> [accessed 4 March 2015].
[43] Timothy Morton, *The Ecological Thought*, p. 14.
[44] Morton, *The Ecological Thought*, p. 4.
[45] Morton, *The Ecological Thought*, p. 34.

[46] Morton, *The Ecological Thought*, pp. 34-5.
[47] Morton, *The Ecological Thought*, pp. 4-5.
[48] Shapin, 'Science and the Modern World', p. 443.
[49] Steve Sailor, 'Q&A: Steven Pinker of "Blank Slate"', <http://pinker.wjh.harvard.edu/books/tbs/media_articles/2002_10_30_upi.html> [accessed 10th December 2013].
[50] Steve Sailor, 'Q&A: Steven Pinker of "Blank Slate"'.
[51] Steve Sailor, 'Q&A: Steven Pinker of "Blank Slate"'.
[52] Chakrabarty, 'The Climate of History: Four Theses', p. 211.
[53] Shapin, 'Science and the Modern World', p. 442.
[54] Haraway, *Anthropocene, Capitalocene, Chthulucene*.
[55] Helen Stuhr-Rommereim and Meagan Day, 'Intellectual Infection: A Conversation About Donna Haraway', <http://www.full-stop.net/2012/12/06/features/meaganhelen/intellectual-infection-a-conversation-between-helen-stuhr-rommereim-and-meagan-day-with-donna-haraway-in-absentia/> [accessed 23 March 2015].
[56] Morton, *The Ecological Thought*, pp. 18.
[57] As Morton notes, this 'invidious phrase' of Herbert Spencer's was only inserted into *The Origin of* Species after Darwin was persuaded to include it by fellow naturalist Alfred Russel Wallace. See Morton, *The Ecological Thought*, p. 30.
[58] Donna J. Haraway, *When Species Meet: Posthumanities* (Minneapolis, MN: University of Minnesota Press, 2008), p. 16.
[59] It should be noted that Haraway is indebted to Lynn Margulis' writings on symbiogenesis in her own formulation of 'becoming with'.
[60] In *The Extended Phenotype* for example, Dawkins is at pains to emphasise 'self-interest' as the way to think about 'genetic action at a distance'. See Richard Dawkins, *The Extended Phenotype: The Long Reach of the Gene*, (Oxford, Oxford University Press, 1999. First Published 1982), pp. 234-7.
[61] See for example a recent paper that draws attention to how endosymbiosis can be thought of as 'a large mutational change' within the existing neo-Darwinist understanding of population genetics: Maureen A. O'Malley, 'Endosymbiosis and its implications for evolutionary theory', *Proceedings of the National Academy of Sciences of the United States of America*, 112 (2015), 10270-10277 <http://dx.doi.org/10.1073/pnas.1421389112>.
[62] Indeed, whilst cautioning against the types of holism that he sees represented by ideas such as Gaia – to which Margulis famously made major contributions – Morton's discussion of the mesh brings together both Dawkins' *The Extended Phenotype* and Margulis' Endosymbiosis. See Morton, *The Ecological Thought*, pp. 34-6.
[63] Morton, *The Ecological Thought*, p. 17.
[64] Isabelle Stengers, Heather Davis and Etienne Turpin, 'Matters of Cosmopolitics: on the Provocations of Gaïa', in *Architecture in the Anthropocene: Encounters Among Design, Deep Time, Science and Philosophy*, ed. by Etienne Turpin (Ann Arbor, MI: Open Humanities Press, 2013) <http://dx.doi.org/10.3998/ohp.12527215.0001.001>. Stengers reference here to 'critters' is a reference to Haraway's ideas in *When Species Meet*.
[65] Stengers, Davis, and Turpin, 'Matters of Cosmopolitics'.
[66] Morton, *The Ecological Thought*, p. 8.
[67] Morton, *The Ecological Thought*, p. 12.
[68] Stengers, Davis and Turpin, 'Matters of Cosmopolitics'.
[69] Morton, *The Ecological Thought*, p. 14.
[70] Vonnegut, *Cat's Cradle*, p. 175.
[71] Vonnegut, *Cat's Cradle*, p. 175.
[72] Kurt Vonnegut, *Galapagos* (London: Flamingo, 1994), p. 16.
[73] Vonnegut, *Galapagos*, p. 39.

[74] Vonnegut, *Galapagos*, p. 60.
[75] Vonnegut, *Galapagos*, p. 28.
[76] Steve Sailor, 'Q&A: Steven Pinker of "Blank Slate"'.
[77] Vonnegut, *Galapagos*, p. 16.
[78] Vonnegut, *Galapagos*, p. 234.
[79] Leonard Mustazza, *Forever Pursuing Genesis: The Myth of Eden in the Novels of Kurt Vonnegut* (London: Associated University Presses, 1990), pp. 25-6.
[80] Vonnegut, *Galapagos*, p. 213.
[81] Vonnegut, *Galapagos*, p. 213.
[82] Steve Sailor, 'Q&A: Steven Pinker of "Blank Slate"'.
[83] Steve Sailor, 'Q&A: Steven Pinker of "Blank Slate"'.
[84] Vonnegut, *Galapagos*, p. 154.
[85] Numerous variations on this aphorism exist. The author and director Samuel Fuller described war as 'organised insanity' in an interview about his Korean war film *The Steel Helmet* (1951). See *Samuel Fuller Interviews*, ed. by Gerald Peary (Jackson, MS: University Press of Mississippi, 2012), p. 122.
[86] Vonnegut, *Galapagos*, p. 86.
[87] Vonnegut, *Galapagos*, p. 86.
[88] Vonnegut, *Galapagos*, p. 50.
[89] In a sense, this focus on the brain is reminiscent of Louis Althussers' own apparent belief that there is an innate tendency in the human mind to create ideologies. See David Hawkes, *Ideology*, 2nd edn (London: Routledge, 2003), p. 119. Kindle ebook.
[90] Vonnegut, *Galapagos*, p. 39.
[91] Chakrabarty, 'The Climate of History: Four Theses', pp. 213-4.
[92] Chakrabarty, 'The Climate of History: Four Theses', p. 214.
[93] Vonnegut, *Galapagos*, p. 234.
[94] Vonnegut, *Galapagos*, p. 234.
[95] Vonnegut, *Galapagos*, pp. 233-4.
[96] Vonnegut, *Galapagos*, p. 12.
[97] Vonnegut, *Galapagos*, p. 214.
[98] Vonnegut, *Galapagos*, pp. 214-5.
[99] Morton, *The Ecological Thought*, p. 18.
[100] Vonnegut, *Galapagos*, pp. 127-8.
[101] Heise, p. 205.
[102] Vonnegut, *Galapagos*, p. 203.
[103] Heise, p. 205.
[104] Morton, *The Ecological Thought*, p. 33.
[105] Richard Klein, 'Climate Change through the Lens of Nuclear Criticism', *diacritics*, 41 (2013), 82-7 (p. 84) <http://dx.doi.org/10.1353/dia.2013.0015>.
[106] Klein, p. 83.
[107] Klein, p. 84.
[108] Klein, p. 85.
[109] Vonnegut, *Galapagos*, p. 70.
[110] It should be noted that Heidegger himself drew attention to the enframing of humans as a 'resource'. See Martin Heidegger, 'The Question Concerning Technology', in *The Question Concerning Technology and Other Essays*, trans. by William Lovitt (New York, NY: Garland Publishing, 1977), pp. 3-35 (p. 8).
[111] Vonnegut, *Galapagos*, p. 70.
[112] Vonnegut, *Galapagos*, p. 70.
[113] Vonnegut, *Galapagos*, p. 70.
[114] Vonnegut, *Galapagos*, p. 217.

[115] Vonnegut, *Galapagos*, pp. 234.
[116] Vonnegut, *Galapagos*, p. 206.
[117] Vonnegut, *Galapagos*, p.7.
[118] Vonnegut, *Galapagos*, p. 234.
[119] Vonnegut, *Galapagos*, p. 22.
[120] Vonnegut, *Galapagos*, p. 23.
[121] H. G. Wells, *The Time Machine* (New York: Atria, 2011), location 490 of 1902. Kindle ebook.
[122] Brian Aldiss, *Hothouse* (London: Penguin, 2008), p. 168.
[123] Tally, pp. 131-47.
[124] Tally, p. 132.
[125] Tally, p. 132.
[126] Tally, p. 131.
[127] Vonnegut, *Galapagos*, p. 234.
[128] Tally, p. 131.
[129] Stengers, Davis and Turpin, 'Matters of Cosmopolitics'.
[130] Morton, *The Ecological Thought*, p. 19.
[131] James Lovelock, *Gaia: A New Look at Life on Earth* (Oxford: Oxford University Press, 2000), location 431of 2647. Kindle ebook.
[132] Vonnegut, *Galapagos*, p. 217.
[133] Vonnegut, *Galapagos*, p. 31.
[134] Vonnegut, *Galapagos*, p. 233.
[135] Peter Freese, 'Surviving the End: Apocalypse, Evolution, and Entropy in Bernard Malamud, Kurt Vonnegut, and Thomas Pynchon', *Critique*, 36 (1995), 163-177 (p. 170).
[136] Vonnegut, *Galapagos*, p. 206.
[137] Vonnegut, *Galapagos*, p. 206.
[138] Vonnegut, *Galapagos*, p. 217.
[139] Morton, *The Ecological Thought*, p. 8.
[140] Stengers, Davis and Turpin, 'Matters of Cosmopolitics'.

Chapter 4: The Unwitting Consumer: Reading the Scientist of the Anthropocene in Ian McEwan's *Solar*

We saw in the previous chapter how Vonnegut's *Galapagos* brought together human and geologic species histories within a speculative *longue durée* of evolutionary science. The articulation of both histories is also an implicit aim of the Cape Farewell organisation, which describes its mission as bringing together scientists and artists in order to 'stimulate the production of art founded in scientific research' and to 'pioneer [a] cultural response to climate change'.[1] This emphasis on a 'cultural response' raises important questions about the role of the creative arts, including literary fiction, in responding to climate change. In doing so, it also raises questions about the limits and possible epistemological blind spots of scientific discourse for understanding humanity's complex relationship to the biosphere. Indeed, the organisation's emphasis on such art being founded on scientific research touches upon the question we began to address in the previous chapter: how can fiction help readers to think through the insights and open questions of the Anthropocene in ways that reconcile the need for scientific thinking in understanding and responding to anthropogenic climate change, with the anthropocentric and ideological limitations of such thinking?

In 2005 the author Ian McEwan took part in an expedition to the Arctic Circle arranged by Cape Farewell. This chapter considers how the novel that followed – *Solar* – offers a speculative account of a scientist character whose ostensible promise to understand and intervene in the human relationship with the biosphere is complicated by his consumerist impulses to enframe nature as a resource for his own consumption. As I go on to demonstrate, the measured and selective focalisation of the text through this character draws attention to the limits of anthropocentric technoscience to explain and provide solutions to anthropogenic climate change, and helps readers to think through an unexpected and potentially apocalyptic danger of the consciousness of human and geologic histories suggested by the Anthropocene.

David Amigoni has described the importance of science in McEwan's fiction in terms of an interrogation of 'what science may mean in the lives of western subjects at a time of both great material comfort and multiple threats'.[2] In a discussion of McEwan's earlier novel *Saturday* (2005), Amigoni lists terrorism, warfare and urban violence as examples of such threats, but his observation has particularly important and urgent implications for understanding the representation of science in the context of anthropogenic climate change in *Solar*. The novel's concern for the 'meaning' of science to 'western subjects' is hinted at in McEwan's own claim that the novel 'had its beginnings'[3] in his experience of the Cape Farewell expedition itself. This

authorial claim suggests that a central concern of the novel lies in how scientific knowledge may provide a means of understanding climate change.

In drawing attention to this link between the novel and McEwan's non-fictional account of the expedition, I am not suggesting that *Solar* should only be understood as a mediation of McEwan's experiences of and reflections on this journey. But there are potentially revealing parallels between McEwan's reflections on the expedition and specific aspects of the novel. Several incidents on the real expedition, in particular the inability of the participants to keep the ship's 'boot room' tidy and fully equipped, clearly inspired the situational comedy of similar incidents that are described in *Solar*. In an essay written in response to the trip, McEwan contrasts the inability of the environmentally concerned participants to cooperatively manage the finite resources of the boot room with their 'plans to save a planet many times larger'.[4] The problem, McEwan suggests, is that whilst 'the fate of all our boot rooms hangs in the balance',[5] it is not 'evil that undoes the world, but small errors […] gathering in rivulets, then cascades of consequences'.[6] This reflection upon 'cascades of consequences' draws attention to a conscious and deliberate engagement with questions of human agency and the implications of contemporary industrial modernity on the biosphere.

McEwan's insight in the boot room may recall the same sense of complex causality that Vonnegut evokes in the concept of *karass* in *Cat's Cradle*; it may also recall the complex 'connections between events at vastly different scales'[7] that we saw are mediated by Trout's narrative perspective in *Galapagos*. Indeed, the concern for 'small errors' hints at the possibility of an appropriate way to live within the biosphere that is hinted at elsewhere in the essay when McEwan says that:

> […] we will not rescue the earth [*sic*] from our own depredations until we understand ourselves a little more, even if we accept that we can never really change our natures […] Good science will serve us well, but only good rules will save the boot room.[8]

Precisely what McEwan means by 'good rules' is not clear; certainly he does not assume that such rules should be determined by scientific accounts of the world. Indeed, his assertion that 'Good science' is not sufficient on its own to 'save the boot room' suggests a concern for how 'we' – by which he seems to mean some universal human subject – do not always act in ways that science suggests 'we' should. Humans, he suggests, live in ways within the biosphere in spite of the scientific understanding of that biosphere. His call to 'understand ourselves a little more' asserts a need to recognise this way of living if 'we' are to respond to its planetary consequences. But this understanding is framed by his further claim that 'we' cannot 'change our natures'. Such a claim

underlines McEwan's apparent assumption that the way of living with the biosphere he is describing is that of a universal human species, a species moreover with an essential 'nature' that determines their relations with the larger 'boot room' of the biosphere.

This claim also complements Greg Garrard's observation that McEwan's recent novels identify 'the origin of environmental crisis in the interaction of contingent historical circumstances and the universal (to some extent sex-differentiated) psychological tendencies known, for convenience, as "human nature"'.[9] This interaction of historical contingencies with a universal 'human nature' sounds similar to Chakrabarty's account of the interaction of human histories of capital and species history in the Anthropocene. But Chakrabarty is very careful to emphasise that embracing a species history is not the same thing as embracing a 'universal' human nature.[10] Garrard's account of McEwan however does suggest such a tendency in his fiction. This idea of a fixed and essential human nature recalls Leon Trout's account of the 'big brain' as a metonym for some biologically innate 'nature' through which we can understand humanity's damaging relationship with the biosphere. But as we saw previously, Trout's view is complicated by his own narrative account of a species history that is both heterogeneous and in constant transition.

The tendency identified by Gerard is therefore potentially problematic; the myth of a selfish 'human nature' that enframes nature as a resource for consumption, without concern for the finitude of the 'boot room' as a resource, works to naturalise this enframing by suggesting that all humans are naturally and inevitably the geologic agents of the Anthropocene. There is no space in this analysis for humans to challenge the 'technological horizon' of modernity that Heidegger identified, nor to resist a relationship of exploitation with nature. Evi Zemanek has even suggested that McEwan is a 'sceptic of humanity's ability to change'.[11] In light of this observation, McEwan's statement concerning the homogenous fixity of 'our natures' appears strangely ideological; a repetition of the anthropocentric enframing of nature as an unavoidable and inevitable aspect of being human.

Again, this is not to suggest that *Solar* should only be read as a literary exposition of McEwan's reflections on his Cape Farewell experiences. Indeed, we shall see that the novel's satirical account of its main character and focalising agent, a Noble Prize-winning physicist called Michael Beard, offers a much more nuanced and complex representation of human agency in the contemporary context than McEwan's comments on the expedition suggest. Yet McEwan's discussion of 'human nature' and the boot room are at times reframed within the fictional world of the novel as the thoughts of Beard: 'But what about the general disgrace that was the boot room? Evidently, a matter of human nature […] Boot rooms needed good systems so that flawed creatures could use them properly.'[12] Beard appears to share McEwan's view on human nature, and does not believe in 'profound inner change'.[13] I would therefore like to suggest that the imperative to 'understand ourselves', and the problematic suggestion that there is an 'essential'

human nature that structures the human relationship with the biosphere, prefigures the central questions that *Solar* goes on to examine. How are scientific understandings of and responses to anthropogenic climate change marked and limited by anthropocentric assumptions that naturalise the human exploitation of the biosphere? And what are the implications of such limits for the possibility of technoscientific intervention in the biosphere?

Michael Beard: The Scientist in Fiction in an Era of Climate Change

In examining these questions, we must understand how the novel explores and complicates the role of science and scientists in articulating the relationship between humans and the biosphere, and in mediating technoscientific interventions to anthropogenic climate change. Central to this analysis is the ironic depiction of Beard himself. Beard is framed by the novel through the measured use of generic codes and conventions from what M. John Harrison has described as the novel's 'entanglement of genres'.[14] In what Harrison describes as the novel's sub-plot of 'north London adultery', [15] Beard hatches a scheme to make his unfaithful wife 'jealous and unsure'[16] by fabricating his own liaison with another woman in their home by intricate use of a radio and a staircase. The text presents this scheme as cleverly conceived but absurd: it is '[…] the kind of logical plan only a madman might embrace'.[17] In the tradition of a 'Hitchcock Thriller', [18] Beard frames one of his wife's lovers, a builder called Rodney Tarpin, for the accidental death of the young physicist Tom Aldous. Beard's responses to police questioning are presented as robust and convincing because '[…] as a man of science, Beard had an automatic respect for internal consistency'.[19] Later, in a 'Bradburyesque comedy of academic plagiarism', [20] Beard plagiarises Tom Aldous' work and carefully exploits the academic system of which he is a part to reap financial rewards from this act of intellectual theft.

Each of these examples constitutes a pastiche of the genres identified by Harrison. This pastiche works by contrasting each genre's conventions with the novel's wider framing of Beard as a Nobel Prize winning scientist; his ruse with the radio and staircase is absurdly played out in a 'scientific' manner. Through this pastiche the novel draws attention to the ways in which Beard is not only and not always this scientist. His fictional life is complexly interconnected with other characters and with the novel's depiction of contemporary industrial modernity. As a scientist, Beard is no more isolated from these connections than Felix Hoenikker is from his *karass*. By highlighting this complexity through an 'entanglement' of generic conventions, the novel establishes an ironic distance between the 'rational scientist' suggested by Beard's role as the primary scientist character in a novel concerning climate change, and the depiction of Beard that the novel ultimately offers. This irony is important, because it signals the ways in which Beard's

means of understanding anthropogenic climate change are as much a product of the social world he inhabits as they are of his scientific knowledge claims.

Reading the Scientist in *Solar*

The ironic depiction of Beard is particularly acute when considered in comparison to how scientists are depicted in McEwan's previous fiction, and specifically how these scientists relate their scientific knowledge to the world around them. The focalising character of McEwan's *Saturday* (2005) for example is a neurosurgeon called Henry Perowne, who applies his scientific knowledge of the biological mechanisms of the brain to a variety of non-scientific situations. These include confrontations with a violent man known as Baxter, and debates surrounding the invasion of Iraq. Perowne's apparent inability to think through these events other than through science parallels the depiction of Felix Hoenikker discussed in Chapter 3; he recognizes the symptoms of Huntington's disease in Baxter,[21] and even interprets his body language in terms of the workings of his nervous system. Yet it is his daughter's reading of a poem by Mathew Arnold that contributes to the resolution of the crisis that then unfolds as a result of Baxter's illness.[22] Perowne's scientific understanding is not sufficient on its own. Similarly, he attempts a rational assessment of the facts surrounding the US-led invasion of Iraq in 2003 as a counter to the 'columns of ungrounded certainties' that litter the newspapers.[23] Yet this rational assessment makes him appear as an apologist for the invasion; whilst his insights provide a critique of the rhetoric of the press and the politicians, they also give inadequate attention to the grave human consequences of the invasion. In seeking to understand the world only in terms of the scientific traditions of rationality and reason, Perowne appears to lack the language with which to articulate the ethical and political implications of the war.

Perowne's difficulties epitomise what Thomas Jones has identified as a common tendency in McEwan's scientist characters; to be recognisable as scientists precisely 'because they think like scientists'.[24] Another example Jones highlights of this in 'textbook psychological realism'[25] is Leonard Marnham in *The Innocent* (1990), an engineer with a degree in electronics who at one point in the novel recalls a complex circuit diagram in order to hold off premature ejaculation. Yet whilst this particular example could also be explained as a comic moment, Jones goes on to criticise a later example from *The Innocent* in which Marnham wants to draw 'an emotional circuit diagram' of his girlfriend. This, suggests Jones, is precisely 'the way someone who isn't an electronics engineer would mock an electronics engineer for thinking',[26] and makes it hard to view Marnham as a human. For McEwan's earlier scientist characters then, thinking 'like scientists' seems to signal a 'monomania' that either excludes or replaces non-scientific thinking, and by extension the character's ability or willingness to think about and respond to the world

outside of a scientific frame of reference. It is this monomania that constitutes the figure of a rational scientist in these texts.

In *Solar*, by contrast, the overarching crisis of climate change is viewed from the perspective of a scientist character whose relationship with science is less consistent and more complex. Beard certainly claims to comprehend all aspects of the world scientifically, and in so doing appeals to the figure of the rational scientist identified in McEwan's earlier work. These claims are ironically underlined in the novel's 'Hitchcock thriller' sections when the narrative relates his scientific 'respect for internal consistency'.[27] Later, when expressing his opposition to psychoanalytic explanations of human behaviour, the narrative reveals that 'Beard was equally bound to believe that this was the kind of nonsense that science was invented to protect him from'.[28] Both of these moments in the text allude to Beard's monomania of thinking 'like scientists' think in all situations.

However, it is significant that these moments are articulated by the text's third person narrative voice in a way that approaches free indirect discourse. The effect of this narrative distance is that it blurs the distinction between Beard's own thoughts and the narrator's on-going characterisation of Beard.[29] The claim of a scientific 'respect for internal consistency' appears to come from Beard, and could certainly be his words. But elsewhere in the text the narrator undermines such claims. As the novel opens, for example, it is revealed that Beard has not conducted any real scientific research for many years:

> Two decades had passed since he last sat down in silence and solitude for hours on end, pencil and pad in hand, to do some thinking, to have an original hypothesis, play with it, pursue it, tease it into life.[30]

This past dedication to 'thinking' is a reference to the research that produced the 'Beard-Einstein Conflation': the work that secured Beard's scientific fame and prosperity. As an image of the dedicated scientist heroically teasing out the secrets of the universe, this account contrasts with the text's descriptions of how Beard has subsequently 'coasted from year to year'[31] on the reputation he gained from this work. This 'coasting' is exemplified by his being 'always on the lookout for an official role with a stipend attached',[32] which is the overtly mercenary reason that he accepts an appointment as head of the National Centre for Renewable Energy early in the narrative. His subsequent involvement in developing solar energy, which drives the novel's plot, is therefore framed as a means of reasserting his professional status and income rather than a genuine pursuit of new scientific knowledge with which to intervene in anthropogenic climate change. In the contradiction between the scientific achievements of his youth and the cynical 'coasting' of his middle-age, Beard is therefore anything but 'internally consistent'.

It is through these early moments of character exposition that the narrative forewarns the reader of a recurring theme of the novel: that Beard's claim to embody the figure of the rational scientist is a myth produced by his own belief in that same figure of the rational scientist that we see repeated in McEwan's earlier texts.[33] But when the narrator relates Beard's claims of rationality through indirect free discourse in the examples given above, the effect is a particularly ironic commentary on the ways in which Beard misleads *himself* in his own self-understanding. Indeed, the narrative distance at such moments signals the irony at the heart of the novel; in laying claim to a particular figure of the rational 'man of science', Beard is in fact the very opposite of this figure.

Not Thinking Like a Scientist: The Climate Change Sceptic

As the main narrative focaliser in the novel, the ironic distance between Beard's actions and motives and the supposed rationalism of his own scientific knowledge claims is particularly important. Beard's focalising function serves to filter the narrative's depiction of how science understands and responds to anthropogenic climate change. But the ironic distance between Beard's view of himself, and the reality inferred at key moments by the third person narrator, relays a potential tension between Beard's scientific knowledge claims and the non-rational aspects of Beard's character.

An example of how this tension is revealed in the course of the narrative can be found in the text's account of Beard's views on climate change itself. Whilst 'not wholly sceptical', Beard initially views climate change as only one 'in a long list of issues' that he expects to be resolved by governments meeting and taking some unspecified action.[34] Moreover, he exhibits a passive scepticism towards the public discourses surrounding the problem of climate change. Early in the text, Beard takes issue with what he views as the sense of 'peril', and the 'Old Testament ring to the forewarnings' that frame representations of climate change in the media. To Beard, such forewarnings

> […] suggested a deep and constant inclination, enacted over the centuries, to believe that one was always living at the end of days, that one's own demise was urgently bound up with the end of the world, and therefore made more sense, or was just a little less irrelevant.[35]

This extract describes what Beard later refers to as an 'apocalyptic tendency'[36] in discussions of climate change. This tendency seems to recall Frank Kermode's historical account of apocalypse, which frames apocalypse as a cultural phenomenon. As we saw in Chapter 2, this cultural function

forecloses the possibility of an actual end to history, and in doing so obscures geologic agency. What is particularly significant about Beard's scepticism towards climate change is the way in which this cultural function readily displaces the kind of scientific analysis that Beard otherwise claims to cherish. Indeed, the third person narrator highlights the irony of this:

> And of course he knew that a molecule of carbon dioxide absorb[s] energy in the infrared range, and that humankind was putting these molecules into the atmosphere in significant quantities. But he himself had other things to think about. And he was unimpressed by some of the wild commentary that suggested the world was in 'peril' […] [37]

This passage leads into his account of the 'apocalyptic tendency' discussed above. The first sentence reminds the reader that Beard has the scientific knowledge to understand the threat. Yet this understanding is cast aside by the subordinate conjunction of the following sentence, in which the decision to think about 'other things' is justified by the 'wildness' of the 'commentary', a justification then backed up by the account of an 'apocalyptic tendency'. This passage suggests that Beard's capacity to understand climate change from a scientific perspective is repressed, or at least discouraged, by his repetition of an account of apocalypse as a facet of human history. At this moment Beard is not the monomaniac scientist of McEwan's earlier novels; he is not thinking like a scientist about climate change.

Beard's initial unwillingness to apply his own scientific expertise to his understanding of anthropogenic climate change is an example of how the text makes use of irony to draw attention to the limits of scientific knowledge as a means of fully understanding how and why climate change is taking place. The implication is that such knowledge, in this case of the physical mechanisms of the 'greenhouse' effect, does not exist in isolation to non-scientific impulses and concerns – even for a scientist. It is therefore necessary to understand the ways in which subjects such as Beard are encouraged to ignore their relationship with these mechanisms in a very contemporary context. McEwan gestures towards this necessity in his Cape Farewell essay when he suggests that 'we' must 'understand ourselves a little more'[38] in order to save the Earth. But this statement fails to elucidate the specific difficulties of arriving at such an understanding. Namely: the problematic use of universal terms such as 'ourselves' as a way of thinking about human contributions to climate change, when this contribution is neither ahistorical nor homogeneous;[39] and the ways in which any understanding of 'ourselves', collectively or as individuals, is itself a product of naturalised anthropocentric assumptions. We will now examine how the novel begins to confront these difficulties by analysing two significant narrative threads. The first is how the novel presents Beard's own obsessive consumption – particularly of food – as

a critique of the human species and its collective overconsumption of resources. The second is the means by which the novel depicts Beard's solution to climate change, in the form of industrial solar power, as a response that leaves undisturbed the anthropocentric foundations of ideology under industrial modernity.

'The General Condition': Beard's Naturalised Overconsumption

Beard's status as a consumer is first related with the particularly striking description that opens the novel: 'He belonged to that class of men – vaguely unprepossessing, often bald, short, fat, clever – who were unaccountably attractive to certain beautiful women. Or he believed he was, and thinking seemed to make it so.'[40] In this passage Beard is immediately identified with a 'class' of men, where 'class' is taken in its broadest sense; socio-economically middle class, middle-aged, and accustomed to a certain standard of living and status. At the same time, we are first alerted to the limits of Beard's self-understanding in this opening passage; it is in thinking that he is 'unaccountably attractive to certain beautiful women' that he becomes so. This self-construction points to the ways in which his view of himself may not be objective. Indeed, for all that he subsequently claims to epitomise an heroically rationale post-enlightenment figure, the novel's opening frames him more as a self-deluding middle-class consumer.

Central to the novel's depiction of this consumption is Beard's obsession with food, through which the novel associates Beard's consumerist impulses with the anthropogenic consumption of resources. A key example of this association occurs when Beard arrives at a corporate event at the Savoy Hotel to give a speech to potential investors in his solar energy scheme. Despite having already eaten a heavy lunch in business class on the plane returning him to London and not feeling 'truly hungry',[41] he is drawn to the sight of dishes 'heaped with plump pillows' of salmon sandwiches.[42] He eats nine of these, but as he begins his speech he starts to feel 'an oily nausea'[43] in his stomach. This feeling is juxtaposed with the opening of his speech, which draws upon this nausea: '"The planet," he said, surprising himself, "is sick."'[44] His sickness here parallels the planetary 'sickness' of which he speaks, and the final consequences of his over-indulgence are a telling collapse of his body's ability to cope with this abuse as he vomits the food he has consumed.

The abuses to which Beard subjects his body can be considered 'anthropogenic' in the sense that they have been caused by Beard's lifestyle of over-exploiting resources, and also by the possibility of that lifestyle that exists within western consumer culture. Beard himself contributes to this consumer culture through his participation in neoliberal capitalism and consumption. In these respects, Beard is reminiscent of other over-indulgent characters in contemporary literary fiction, such as the character of John Self in Martin Amis' *Money: A Suicide Note* (1984), with his

excessive consumption of food and drink, and his voracious sexual appetite, both of which drive and are driven by his love of money. Like Beard, Self's consumption is 'Self'/self-destructive, a form of 'suicide', that is expressed visibly though his bodily appearance, his 'tannic teeth',[45] his fat body, 'like a clutch of plumbing, the winded boiler of an old tramp',[46] and his developing heart condition. Also, like Beard, Self's consumption is perversely validated by the society he inhabits. It is supported and even obliquely encouraged by the super-abundance of New York and the access to drink, food, and sex that his success in accumulating capital allows.

If the incident of vomiting at the Savoy can be thought of as a symbol of the short-term effects of abusing a resource, then Beard's slow descent into clinically significant obesity across the three time periods of the novel represents the longer-term damage of unfettered consumption and pollution. The novel addresses this long-term damage in terms of Beard's inability to constrain his eating, despite 'many general resolutions and virtuous promises' to do so.[47] One 'typical failure' of this resolve during a flight from Berlin is particularly telling: 'Then there was spread before him a white tablecloth, the sight of which fired some neuronal starter gun for his stomach juices. The gin melted his remaining resolve.'[48] The use of biochemical terminology here suggests another example of indirect free discourse; this passage is relating Beard's own reflections on why he has suffered this 'typical failure' of his resolve. Yet rather than mobilise science as a means of intervening in his obesity, he instead offers it as a means of naturalising his own overconsumption; the suggestion is that his resolve is ultimately 'melted' by biology. The effect of the closing of narrative distance here is therefore to ironically draw attention to the absurdity of mobilising scientific knowledge and reasoning as a way of legitimising damaging overconsumption. This ironic depiction of a scientist who understands his own damaging overconsumption, but is unable to constrain it, echoes the ways in which technoscientific industrial modernity has failed to restrain its own damaging consumption of the resources of the biosphere.

Indeed, it is through this irony that *Solar* encourages readers to draw parallels between Beard's consumption of unhealthy food and the larger inability of human societies to regulate their consumption of the resources and energy production methods that are associated with environmental crisis and geologic agency. We can understand this parallel in terms of the journalist Max Ajl's definition of climate change as essentially 'a problem of production and consumption' in which 'our current consumption pattern' is not sustainable.[49] Quoting Neal Lawson's assertion that consumerism is the 'heroin of human happiness', Ajl further suggests that this inability to move away from such damaging consumption is a consequence of a form of addiction to it. Like an addict, Beard knows his diet is damaging him physically as he observes a variety of physical pains and other symptoms,[50] yet he appears unable or unwilling to resist consumption.

Beard's reproduction of overconsumption in the face of personal harm may recall Slavoj Žižek's description of a capitalist as someone who is dedicated to the reproduction of the capitalist system, even at the expense of humanity itself, not for 'gain or goal' but purely for the sake of this reproduction 'as an end-in-itself'.[51] Beard appears trapped in a similar logic, but I would suggest that the 'evil' 'ethical dimension'[52] that Žižek describes is inadequate for explaining the kind of consumer capitalist reproduction represented by Beard. Beard does not 'faithfully pursue'[53] capital in the conscious manner of a zealot implied by Žižek;[54] he is not that enthusiastic or dedicated a character, and his actions appear more like the unconscious ideological reproduction of enframing nature as a resource that we have seen maintain the conditions of industrial modernity. Instead, Ajl's notion of an addiction is more useful in understanding Beard's ideological inscription as a consumer. The pathology of this addiction is registered through Beard's 'typical failure(s) of resolve', and his ironic offering of scientific knowledge as a means of absolving himself from responsibility for these failures. It is through this pathology of addiction that the text depicts Beard's scientific knowledge as working to naturalise his unreasonable choices. In this way, Beard embodies what Ingolfur Blühdorn describes as 'the evident contradiction between late modern society's acknowledgment that radical and effective change is urgent and inescapable and its adamant resolve to sustain what is known to be unsustainable'.[55]

The narrative's ironic foregrounding of this contradiction through Beard serves an important allegorical role in the novel. As Tuhus-Dubrow notes, in representing 'an extremely intelligent creature who exploits those around him and is ultimately self-destructive', Beard 'seems to stand in for the entire human species'.[56] Beard's choices in overeating can be viewed as an imaginative way of depicting precisely that broader impulse to over-consume that underpins the geologic agency of technoscientific industrial modernity. But the ironic depiction of Beard also suggests that these impulses are beyond the reach of scientific knowledge to adequately intervene in. For just as Beard's inability to limit his overeating is framed by his biochemical language as a natural and inevitable consequence of his bodily chemistry, so too is the over-consumption of the biosphere by the subjects of industrial modernity framed by McEwan in his Cape Farewell essay as a consequence of an unchanging human 'nature'. This naturalisation of overconsumption – effectively the naturalisation of enframing nature as an infinite resource – is not readily challenged by scientific knowledge alone. Indeed, it is through a selective mobilisation of scientific knowledge that Beard further naturalises his own failure to change. In reading the fictional scientist Beard as an allegorical figure for societies of modernity who manifest such naturalisation, the novel helps us to think through the contradiction described by Blühdorn and identify its anthropocentric causes.

‘Business as Usual’ Capitalism: Technoscience and the ‘Good’ Anthropocene

This allegorical reading of Beard becomes particularly significant when read alongside his pursuit of a specifically technoscientific solution to anthropogenic climate change during the course of the novel. Beard’s solution – industrial solar power – is suggestive of an adamant faith in technoscience as a means of intervening in the environmental consequences of industrial modernity. But the novel reveals how this faith is underpinned by the very same anthropocentric assumptions that serve to ideologically naturalise modernity’s damaging relationship with the biosphere.

Such faith is first represented in the novel through the character of the young physicist Tom Aldous, whose work on solar energy Beard ultimately plagiarises. Aldous views climate change as a threat that can only be responded to through technology and science operating under the direction of free market capitalism. In one particularly important passage he expresses this faith by asserting the need for a new fuel: ‘Coal and gas have made us, but now we know, burning the stuff will ruin us. We need a different fuel or we fail, we sink.’[57] Aldous’ choice of words here are critical to understanding how this character’s solution to anthropogenic climate change is underpinned by a particular perspective on the relationship between human societies and the biosphere. His emphasis on exploiting ‘coal and gas’ underlines the reliance of industrial modernity upon the technoscientific enframing of nature – specifically fossil fuels – as a resource. But he also tacitly acknowledges the role of these natural resources in ‘making us’, which suggests that he views the human subject of this modernity as having been co-created by those very same elements of the biosphere – coal and gas – that industrial modernity has exploited. Aldous therefore appears to have some awareness of how industrial modernity and the geologic agency of its subjects have emerged from a complex interrelation of the human species and the geologic history of coal and gas.

But the implications of this awareness for responding to anthropogenic climate change are complicated by his faith in the purely technological solution of a ‘different fuel’. Later in the same passage, he describes his idea of industrialised solar energy production and responds to Beard’s doubts about how the resulting electricity would be transported by declaring: “Yes! New DC Lines! That’s just money and effort. Worth it for the planet! For our future Professor Beard!”[58] Aldous’ assertion that his solution requires only ‘money and effort’ assumes that the existing dominant economic and political structures of modernity that fund and direct science and industrial technology will ensure that his ‘different fuel’ is discovered and exploited. He views the responses of both science and industrial capitalism to anthropogenic climate change as one and the same:

'money and effort' is a worthwhile 'investment' in a future that Aldous imagines solely in technoscientific terms. By expecting industrial modernity itself to produce a response to anthropogenic climate change by continuing to mobilise scientific knowledge through existing forms of production and consumption, Aldous fails to question the enframing of nature as a resource. The anthropocentrism of the supposedly universal 'us' that coal and gas have created is left undisturbed.

Aldous' perspective is distinctive in the way that it represents a complex view on the legitimacy of enframing nature as a resource. His account of how fossil fuels 'made us' but are also now threatening to 'ruin us' implies that geologic history is inextricably entwined with the history of industrial modernity. Although neither he nor Beard actually use the word 'Anthropocene', Aldous' perspective on how human and geologic history are interdependent in ways that 'we now know' is suggestive of a new way of thinking about this relationship that does parallel the understandings of the Anthropocene discussed previously. Furthermore, in suggesting that 'we' are the products of the geologic history of fossil fuels, Aldous appears to gesture towards an understanding of humans having 'become with' the biosphere in the sense described by Donna Haraway and discussed in the previous chapter. Yet, in the context of Aldous' speech, these insights are mobilised as a means of legitimising his scientific quest for 'a different fuel'. In this way, his emphasis on the importance of the biosphere and its geologic history in co-creating some universal human subject of industrial modernity serves only to re-affirm the exploitation of nature as a resource by that subject. His understanding of this co-creation is limited to processes in which humans exploit nature.

Aldous' perspective helps us to begin to think through a potential limitation of thinking about the Anthropocene: namely that recognising the ways in which the histories of industrial modernity and the geologic history of the biosphere are entwined does not necessarily provide a critique of the exploitation of nature. Indeed, Aldous' account of the history and proposed future of the human relationship with nature is suggestive of a way of thinking about the Anthropocene that describes this relationship precisely as a means of legitimising further exploitation. He is essentially making an 'appeal to nature' of the kind discussed in the previous chapter, which instrumentalises a scientific understanding of the Anthropocene to assert the need for a new energy source. It is in framing the need for this 'different fuel' within the historical perspective of how coal and oil 'made us' that Aldous casts this further exploitation as a natural progression in the on-going co-creation of a universal human subject.

Aldous' perspective on how best to respond to anthropogenic climate change helps us to think through aspects of what Isabelle Stengers has more recently described as the 'good anthropocene [*sic*]'.[59] In an analysis of the differing scientific foci of the Intergovernmental Panel on Climate Change (IPCC) working groups, Stengers describes how attempts to 'solve'

anthropocentric climate change through technical and economic processes will eventually lead to an attempt to 'tame Gaia' through technoscience. This 'taming', she suggests, will 'be presented as a logical accomplishment in the great history of human emancipation and mastery'.[60] It is through such presentation that the human influence upon the biosphere – which underpins the concept of the Anthropocene – is recuperated, and the Anthropocene itself is re-cast as 'good'.

For Stengers, this potential for the Anthropocene to be co-opted as a way of recapitulating the story of the human subject's dominion over nature highlights a key problem with the concept. But even Stengers' account of how a concept of the 'good anthropocene' might emerge from the market-orientated focus of IPCC Working Group III casts this problem as a consequence of the well-meaning naïveté of IPCC scientists. In *Solar,* however, McEwan draws particular attention to the ease with which Aldous' hopes for a technoscientific solution to save 'the planet!' are co-opted by the naturalised consumer impulses embodied by Beard. Beard appropriates Aldous' work as a means of re-invigorating his professional and financial status, a motive underlined by the text with the line: 'All Beard asked, beyond a reasonable return, was sole attribution'.[61] This desire for the money and academic rewards afforded by Aldous' work forewarns the reader that Aldous' solution is always and already subject to the naturalisation of overconsumption that the novel elsewhere reveals through the figure of Beard.

Indeed, the text underlines the ways in which Aldous' technoscientific solution is underpinned by the same anthropocentric assumptions that sustain Beard's overconsumption through a technique of ironically repeating Aldous' rhetorical speech through Beard. A significant example of this can be found in Aldous' rhetorical framing of society as a metaphorical man in a wood who is dying of thirst:

> He has an axe and he starts cutting down the trees to drink the sap. A mouthful in each tree. All around him is a waste-land, no wildlife, and he knows that thanks to him the forest is disappearing fast. [62]

In the tenor-vehicle relationship of this metaphor, Aldous is using sap as the vehicle for energy – specifically fossil fuels – and the thirst that drives the man as the vehicle for the social demand for that energy. The consequences of the man's means of obtaining the sap is the environmental destruction of the 'waste-land'. Aldous uses this metaphor to illustrate how the man/society is aware of the destruction he is causing, but knows no other way of obtaining energy than through sap/fossil fuels. The solution is to 'open his mouth and drink the rain'[63] – rainwater then also becoming a vehicle for energy. But the man cannot imagine this solution because it is too different from the means of quenching his thirst with which he is familiar. Aldous' point is not only that solar energy offers a far better solution to the energy needs of society than fossil fuels.

He is also casting the threat of anthropogenic climate change as a problem of technoscientific imagination that can be overcome through innovation.

However, in using this metaphor Aldous obscures a critical but hidden assumption; namely that the contemporary energy needs of industrial modernity are as innate and natural as the biological need for water. This assumption underpins his metaphor's ground of comparison between energy and rainwater. But this comparison is an example of what Paul De Man calls the 'false literalism' of a metaphor;[64] by implying that the ground of comparison between the tenor and vehicle of his metaphor is the energy that both human organisms and industrial modernity require for survival, Aldous effectively naturalises the exploitation of nature by societies of modernity. Such exploitation is presented as biologically innate, even though as a scientist Aldous is quite aware that it is not.

However, it is only when Beard appropriates this metaphor from Aldous in order to convince a group of investors to back his solar energy project that the text reveals the full significance of Aldous' language:

> He has an axe in his hand and he is felling the trees in order to suck sap from the trunks. There are a few mouthfuls in each tree. All around him is devastation, dead trees, no birdsong, and he knows the forest is vanishing. [65]

This is Beard's version of the same metaphor, as delivered to a group of investors at The Savoy. The metaphor works to perform the same rhetorical work of framing solar energy as a logical response to climate change for a society with a demand for energy that is naturalised through the language of a biological need. What is different is the context. Beard repeats the language of biological need as a way to encourage the individual investors to recognize his project as a natural and self-evident continuation of the exploitation of nature as a resource for capitalism. This contextual change is reflected in part through subtle differences in language that make Beard's version appear more marketable. The sap is now 'sucked' from the trees, which suggests an almost vampiric need to exploit nature. There are now 'a few mouthfuls' in each tree, which implies a more intensive exploitation. The insertion of 'no birdsong' might be an attempt by Beard to allude to a similar auditory image of industrially-damaged nature in Rachel Carson's *Silent Spring*.[66] These changes alert us to how Beard is self-consciously deploying the metaphor as a piece of marketing rhetoric.

Beard is not after all trying to convince the investors to save 'the planet!' but rather that his project is a sound investment, part of a sector that is 'outperforming the rest by doubling every two years'. [67] This focus upon the functioning of the market parallels what Stengers

describes as the contemporary 'business-as-usual approach' exemplified by the IPCC's Working Group III, that same working group whose focus on technoscientific solutions will, she predicts, lead to the naturalisation of a 'good anthropocene'.[68] Indeed, *Solar* points towards a way of thinking about a 'good anthropocene' that can be understood as a particularly contemporary nuancing of the anthropocentric enframing of nature as a resource. By showing how Aldous' way of thinking about anthropogenic climate change ultimately legitimises Beard's business interests, the novel ironically frames perspectives that are central to the idea of the Anthropocene as a way of re-asserting the human subject as both the dominant force in the biosphere and the legitimate heir to its resources. As we saw in previous chapters, such an anthropocentric understanding of the biosphere has dangerously apocalyptic consequences. In this way, the novel draws attention to how the concept of the Anthropocene can be diverted from being a way of thinking critically about the human relationship with the biosphere, and instead might be all too easily recuperated into the service of industrial modernity and the ecologically destructive practices that take place within it. Indeed, it is precisely this risk of recuperation that Stengers alludes to when she forewarns us that the 'script' of naturalising geoengineering is 'already written'.

Through its ironic depiction of how Aldous' concern for anthropogenic climate change ultimately serves to maintain the dominant economic system of contemporary industrial modernity, *Solar* encourages us to think through the limitations of scientific knowledge in recognising the ways in which the human history of that modernity is entwined with the geologic history of the biosphere. As we have seen, Aldous proceeds from a scientific recognition of such entwined histories, but he does not consider the implications of this entwining in terms of how it might complicate his underlying anthropocentric assumptions about the legitimacy of the human subject's exploitation of nature. These assumptions subsist in his metaphoric language – in particular his metaphor of a 'man in the woods' – and reaffirm an exploitative relationship with nature in which the human subject dominates. In tracing Beard's appropriation of this language, the novel draws attention to this exploitative subtext. Indeed, it is a central irony of the text that the revival of Beard's scientific career, which is ostensibly driven by a scientific response to anthropogenic climate change, is in fact predicated upon a continuation of the industrialised exploitation of nature and Beard's own impulse to consume. This narrative irony works to foreground the ways in which the enframing of the biosphere as a resource for exploitation is continuously reproduced under industrial modernity, even in the face of scientific understandings of anthropogenic climate change.

Environmental History and 'Us'

In light of McEwan's assertion in his Cape Farewell essay that 'we can never really change our natures',[69] we might then interpret the novel's imagining of how the ideology of industrial modernity continues to be reproduced 'after' the Anthropocene as implying that such reproduction is somehow inevitable and even itself 'natural'. Indeed, if Tom Aldous' assertion that 'coal and gas have made us' suggests that the subject of industrial modernity has been co-created with the geologic history of the biosphere, then the 'making' Aldous alludes to might also imply a particular historical unfolding in which this subject is only ever capable of an exploitative relationship with nature. Such a reading is supported by Aldous' further assertion that without a 'different fuel […] we fail, we sink',[70] which suggests that this exploitation is the only relation possible for 'us' – by which he means a universal human subject. But this claim rests upon and reproduces a homogenous understanding of 'us' as a species, albeit an understanding that appears to acknowledge how that species has 'become with' the availability of fossil fuels.

Beard shares Aldous' understanding of the contemporary human subject as a singular 'us' that is a product of both geologic and human history. During a key section in the novel in which he looks out over the South-East of England from a descending aircraft, the narrative distance between Beard and the narrator closes in order to provide an important insight into how Beard's understanding of the human relationship with the biosphere is structured by his understanding of the history of this relationship. Beard begins by reflecting on the anthropogenic history of the landscape below. He ruminates on the 'irregular quadrilaterals' of fields and hedgerows that shape the landscape and notes that many of the features were 'probably named in the Domesday Book', before being 'named again with greater refinement, owned, used, costed, traded'[71] over the subsequent centuries. He then imagines the possibility of a future 'giant metropolis' that might spread across the South-East of England and mark a 'modern form of quadrilateral' on the landscape. Finally he asks himself:

> How, […] how could we ever begin to restrain ourselves? We appeared, at this height, like a spreading lichen, a ravaging bloom of algae, a mould enveloping a soft fruit – we were such a wild success. Up there with the spores![72]

Beard's reflections relay a cartographic history of the landscape that for him seems to imply an innate and inescapable human manipulation and exploitation of that landscape. His reference to 'quadrilaterals' in the marking of the landscape by both ancient field systems and future developments of the city, and the 'costing' and 'mortgaging' of that land that this entails,

emphasises that this manipulation and recording is an act of enframing of the landscape as a resource; nature here is imagined only in terms of economic exploitation. The allusion to William the Conqueror and the Domesday Book implies a longer historical unfolding to this enframing. Yet his recurring 'mould' motif frames the 'wild success' of this spread of human activity across the landscape as a type of natural 'lichen' growth. The word 'lichen' is significant here, because lichens are constituted by a symbiotic relation between organisms – indeed, Timothy Morton draws attention to the symbiotic life of lichen in describing how to 'think' the complex interconnections of the 'mesh'. [73] The spread of this 'lichen' suggests a view of the industrialised landscape as a symbiotic assemblage of organism and environment that recalls Aldous' allusion to how humans have 'become with' the biosphere's reserves of coal and gas.

Beard's account of the history of the landscape of 'his familiar corner of England'[74] might then appear to attest to the ways in which the contemporary industrialised scene he is describing has emerged from historical conditions in which human and biosphere are entwined. But as with Aldous' understanding of the importance of coal and gas, the novel reminds us that Beard's understanding of this history is limited by his anthropocentric – and indeed Eurocentric – assumptions. It is after all precisely '*his*' corner of England that he is thinking about, and yet he concludes his account by slipping seamlessly into what sounds like a far more universal claim concerning how '*we*' could never begin to restrain ourselves. This unexamined assumption concerning the 'we' of the human subject is something Isabelle Stengers draws attention to when she asks 'who is *anthropos*?'[75] The answer to such a question is not as self-evident as Beard and Aldous seem to imply when they speak of 'us' and 'we' in their particular contexts. At the very least, the supposedly objective scientist in Beard is here making a very unscientific move by assuming that his localised example is freely applicable to some universal human condition.

Furthermore, in detailing his history of the landscape Beard ignores the far longer geologic history of which it is a part. His is a 'history' that begins with a landscape already marked by farming and the economic and political domination of the state. Indeed, in laying claim to a particular historical unfolding for his account of the 'quadrilaterals' of ancient field systems and the 'spreading lichen' of the city, Beard effectively forecloses the 'deep' geologic history that pre-dates Neolithic farming. The result of this foreclosure is that the contemporary and future conditions Beard is describing appear as an inevitable part of a story of the human species. This historically limited understanding of the Anthropocene again appears to echo what Stengers criticises as the 'good anthropocene', in which the technoscientific manipulation of the biosphere is framed as part of a 'great history of human emancipation and mastery'.[76] Stengers describes how those who resist this story will be 'accused of betraying our destiny'.[77] It is precisely this sense of 'destiny' that Beard re-affirms whilst looking down upon the South-East of England.

Beard's historical perspective is therefore limited to a recapitulation of the 'great history' of the human subject of modernity, in which geologic agency is something innate and inescapable. Indeed, his view of the 'spreading lichen' that cannot be restrained is reminiscent of other climate fictions that have depicted humanity as ultimately doomed to recreate the same practices of consumption and waste that have produced this crisis. J. G. Ballard's *Rushing to Paradise* (1994) for example depicts an ostensibly environmentalist colony on a remote island that begins by satirising the green movement of the early nineties as ineffective and driven by individual desires more than by environmentalism. The further the colonists attempt to move away from the world of modernity, the more they actually reproduce the same structures they purport to reject, before finally descending into a violent nightmare. A similar theme of the ultimate futility of seeking to restrain exploitative human relationships with the biosphere is taken up in T. C. Boyle's *A Friend of the Earth* (2000). This novel satirises the tragi-comic misadventures of an environmentalist who finds that his environmentalism has failed to avert climate catastrophe; moreover, once this catastrophe finally occurs in apocalyptic fashion, people are still unable or unwilling to recognize their own complicity in it. Whilst these two texts might be read as critiques of some of the conditions that have produced what we now call the Anthropocene, and in that respect do not re-affirm a 'good anthropocene', neither do they challenge how the relationships that they describe between the human subject of industrial modernity and the biosphere continue to be naturalised in the contemporary context. Indeed, both texts reproduce assumptions similar to that of Beard that this subject is a universal and ahistorical representation of the human.

Yet Beard's understanding of a universal human subject whose exploitative relationship with the biosphere has an inevitable historical unfolding is complicated by the novel's ironic depiction of Beard himself. As we have seen, Beard functions as an allegorical figure of the modernity that he embodies. His own personal life history – from a baby boomer who represents 'an end to rationing and the reign of plenty to come'[78] to an inveterate consumer who is eating himself to death – reminds the reader that his cartographic history of the English landscape is not relayed from the perspective of a neutral or transcendent observer of history. Rather, Beard's perspective of the Anthropocene is limited and structured by his experience of the post-war emergence of a consumer society; a limit that he himself ignores. I will now illustrate how *Solar* highlights the subjectivity of Beard's understanding of the complex interdependencies between humans and the biosphere through a satirical representation of the objectivism that he claims to cherish. This satire actively draws attention to the ways in which Beard's understanding of anthropogenic climate change – its causes and potential solution – is a product of a naturalised anthropocentric viewpoint. In conducting this analysis, I am proposing a reading of the novel that diverges from that implied by McEwan's own account of the novel's origins on the Cape Farewell

expedition. Indeed, I am suggesting that what McEwan describes as 'our' unchangeable 'natures' and Beard views as the impossibility of ever beginning to 'restrain ourselves',[79] actually reproduces a view of humans in which the anthropocentric exploitation of the biosphere is naturalised.

'Strange Ideas': Objectivity and Human 'Natures'

We have already seen that Beard repeatedly asserts his own scientific rationality. But he also valorises ideals of scientific objectivism more generally, and assumes scientific knowledge to exist independently of external influences such as extant cultural, economic, or political formations. Early in the novel, the narrator summarises Beard's view:

> Let the philosophers of science delude themselves to the contrary, physics was free of human taint, it described a world that would still exist if men and women and all their sorrows did not. In this conviction he was at one with Albert Einstein.[80]

Here Beard states quite emphatically that physics is disconnected from external, non-scientific influence, and in doing so also specifically confronts the alternative view from the 'philosophers of science'. The use of the word 'taint' suggests that Beard views physics as 'pure' in a way that recalls the myth of the 'pure research man' that Felix Hoenikker was supposed to symbolise. This 'purity' signals Beard's view of his own scientific objectivity that runs throughout the narrative and which we have already seen contrasts ironically with his human failings. But this claim of 'purity' is also problematic when considered in light of Chakrabarty's assertion that thinking about the Anthropocene demands placing 'global histories of capital' in conversation with the 'species history of humans'.[81] We saw in Chapter 3 that this claim marks a discontinuity between the historian's view of human history that emphasises the unequal conditions of globalisation under which climate change clearly takes place, and the scientist's view of species history that tends to emphasises how humans are a 'particular kind of species' that is able to acquire 'geologic force'.[82] Whilst Chakrabarty points to the ways in which these positions are in fact reconcilable, Beard's view of science implies that the kind of conversation proposed by Chakrabarty should not take place. This injunction means that Beard is unable to think through the ways in which his understanding of human relationships with the biosphere is complicated by ideas that his own particular view of science does not encompass.

Indeed, Beard's assertion that his science is 'free of human taint' signals a general aversion to any crossing of disciplinary boundaries. Beard is not interested in how the human

history of global capital, and indeed an ideological critique of anthropocentrism, might be relevant to the scientific understanding of anthropogenic climate change. We can better understand this disinterest by considering the significance of Beard's specific reference in the above quote to the 'philosophers of science'. I would suggest that this phrase signals Beard's awareness of the debates surrounding the so-called 'Science Wars' of the 1990s, and more specifically the 1996 'Sokal Affair', in which the physicist Alan Sokal succeeded in having a paper published in the humanities journal *Social Text* that claimed that quantum gravity was a social construct.[83] Sokal later revealed that the paper was a nonsense-piece inspired by Paul Gross and Norman Levitt's *Higher Superstition: The Academic Left and Its Quarrels with Science* (1994), which associates a political agenda with 'cultural constructivist' critiques of science.[84] In a review of Sokal and Jean Bricmont's *Intellectual Impostures* (1998) for *Nature* titled 'Postmodernism disrobed', Richard Dawkins contended that Sokal's paper was accepted by *Social Text* because 'this was a physicist saying all the right-on things they wanted to hear', and that its 'ideology conformed to their own'.[85] Whether this is true or not, such a critique is itself instructive because it tends to suggest that science should not be troubled by political implications. But it is these implications, examined in the issue of *Social Text* in question, that are arguably obscured by the focus on Sokal's hoax. Andrew Ross' introduction to that issue, for example, identifies how the scientific 'ideology of objectivity and truth' was 'under renewed scrutiny' in the context of the 'industrialized [*sic*] phase of science's transformation of nature',[86] or what we might now call the Anthropocene. The articles by Sandra Harding, Hilary Rose, Stanley Aronowitz, and others go on to establish a critical response to the appropriation of scientific knowledge by the government, the military, and capital interests, an appropriation that runs counter to the ideals of social good and a 'steady march towards Truth'[87] that science often lays claim to. These assertions of non-scientific influences upon science question the idea of science as 'value free', and so establish these commentators as part of the 'constructivist' critique of science to which Sokal was in part objecting. But they also clearly anticipate some of the concerns discussed above for how scientific knowledge of the Anthropocene might serve to reproduce the anthropocentric foundations of the ideology of industrial modernity.

Beard's dismissive reference to the 'philosophers of science' can therefore be understood as a rejection of the concern for the political implications of science that are brought under particular scrutiny in the context of the Anthropocene, and a fear that science might be 'tainted' with 'constructivist' ideas that complicate the role of science in understanding and responding to climate change. This fear is underlined in a later passage as follows:

> Beard had heard rumours that strange ideas were commonplace among the liberal-arts departments. It was said that humanities students were

> routinely taught that science was just one more belief system, no more or less truthful than religion or astrology.[88]

Here, Beard appears to be referring to a half-remembered account of either the Sokal hoax itself or the discussions that surrounded it during the 'Science Wars'. In particular, he is interpreting social constructivism as a denial of objective, material reality. Indeed, the above passage echoes Dawkins' discussion of the Sokal hoax in which he highlights how Sokal was inspired by Gross and Levitt's book, and suggests that the eventual article appealed to the editors of *Social Text* because it attacked 'the "post-Enlightenment hegemony" and such uncool notions as the existence of the real world'.[89]

Beard himself encounters these 'strange ideas' through a subplot involving his participation on a committee seeking to promote physics in schools. This section of the novel contains what appears to be another series of oblique references to the Sokal hoax, as Beard comes into conflict with Nancy Temple, a fellow member of the committee and an anthropologist. Beard is dismissive of Temple's recent project to study the work of a genetics laboratory and so demonstrate 'that this gene, or any gene, was, in the strongest sense, socially constructed', and takes instead what the text describes as the 'conventional view' that 'the world existed independently' of observation.[90]

However, the so-called 'constructivism' of the other articles in the 'science wars' issue of *Social Text* is more nuanced than Sokal's hoax, Beard's anecdotal account of 'strange ideas', or even McEwan's account of Nancy Temple would suggest. Sandra Harding states emphatically in her article that:

> Science studies does not claim that sciences are epistemologically relative to each and every culture's beliefs such that all are equally defensible as true. Rather, the point is that they are historically relative to different cultures' *projects* – to cultures' questions about the natural and social orders. Different questions produce different answers […][91]

In this quote, Harding essentially clarifies what is meant by the influence of 'culture' upon the progress of science: that how a culture prioritises its inquiries into 'natural and social orders' determines the questions that scientists ask, and so the answers that science finds. This is a crucial point, highlighted also by Ross, that science is only ever a 'partial representation of knowledge'.[92] It is this partiality that calls attention to external influences upon science: the social, economic, political, and cultural assumptions and value codings that determine what is investigated and how, producing a tapestry of scientific knowledge distinctive to that culture. This

is not the same thing as an assertion of relativism in which the material properties of the universe are refuted. Rather, the purpose is, as Aronowitz argues in his article in *Social Text*, to challenge 'the notion that science and its discoveries are exempt from ideological critique, deconstruction, or historical investigation that might be trained on any other discourse'.[93]

This more nuanced account of constructivism is explored in *Solar* during the scenes that depict the intellectual conflict between Beard and Nancy Temple. In these scenes, the novel relays Beard's view of a biologically determined species history through the specific example of his views on gender. Having casually speculated to a journalist that 'in statistical terms the brains of men and the brains of women were significantly different',[94] Beard encounters a media frenzy in which he is cast by the press as the ''neo-Nazi' Professor'. In the ensuing debate, McEwan again obliquely references Sokal's article through a series of parodic sound bites derived from the lexicon of critical and cultural theories such as postmodernism and feminism. For example, Beard is accused of '[…] crude objectivism by which he seeks to maintain and advance the social dominance of the white male elite […]'.[95] This accusation is almost a caricature of the sort of 'right-on' political agenda Dawkins claimed Sokal was mimicking. Thomas Jones has criticised this scene in the novel for its 'blokeish guffawing' at the 'unthinking deployment of jargon'[96] by Beard's critics. However, this reading ignores how the narrative is focalised through Beard, and should be read in terms of what David Amigoni describes as McEwan's tendency to acknowledge a 'broader cultural narrative' within which 'scientific discourses' are a 'contested component'.[97] The acknowledgement of this contested component, to which Amigoni suggests McEwan's earlier fiction 'contributes subtly, intelligently and imaginatively',[98] can be recognised in the conflict with Nancy Temple. The obvious confusion that Beard experiences in relation to his critics – he is described by the text as being 'bewildered' and 'completely lost'[99] – is key to this. This confusion signals Beard's lack of self-reflection as a scientist; we are alerted to how his view of the neutrality of science and his disregard for science's position within society have rendered him ill-equipped to self-consciously examine a constructivist perspective on gender.

The consequences of this lack of reflection, and indeed Beard's apparent lack of interest in the relationship between science and its social context, are brought into focus by Nancy Temple's resignation from the committee and the text's account of her replacement Susan Appelbaum. Appelbaum's perspective is more nuanced than that of Temple. She relates examples of empirical evidence that contradict much of what Beard had assumed about gender and science.[100] She is both 'objectivist […] empiricist…' and contends that there is 'such a thing as biological sex difference in cognition'.[101] At the same time, she presents strong empirical evidence for 'social factors', concluding that they were 'far stronger signals than objectively measured differences between men and women'.[102] In this way she provides an account of how material reality's existence independent of social context does not preclude a view of how social factors

shape human cognitive outcomes. Instead, her account of gender offers a more nuanced perspective on this facet of human 'nature' in which social constructivism and a positivist view of the material world are no longer viewed as mutually exclusive.

This nuanced account of constructivism provides an important narrative counterpoint to Beard's narrow view of science and objectivity, and reveals the ways in which this view shapes his thinking about the human subject in the Anthropocene. In foregrounding how social factors shape human cognitive outcomes, the perspective offered by Appelbaum complements Chakrabarty's sense that a biologically described species history is not on its own sufficient to understand and respond to the Anthropocene. As Chakrabarty himself notes, species thinking can tend to frame the Anthropocene as a biological outcome of a homogenous history of humans that ignores the ways in which industrial modernity emerged from particular conditions in particular places at particular times. This perspective is especially apparent in the novel in Beard's Anglo-centric ruminations on the landscape of South-East England. As we have seen, Beard views the particular cartographic history of this landscape as some form of universal signifier of the human consumption of nature. This problematic species thinking is informed by his particular economic, cultural, and historical context – his 'familiar corner of England' – through which he views the Anthropocene as a universal human story driven by a fixed biological nature. But by drawing attention to how social factors can indeed influence the construction and understanding of gender, the narrative also reminds us of the more general fallacy of thinking about the human subject purely in terms of an essential biology.

Whilst Beard feels 'reprieved' by Appelbaum's argument, the narrator suggests that he is also aware of an uncertainty as to whether 'he had just taken a good kicking…[or]…that he had triumphed'.[103] Beard's explanation for this uncertainty is that he is 'a physicist after all, not a cognitive psychologist'. [104] This special claim for physics runs throughout the novel, from Beard's early claims that physics is 'free of human taint'[105] to his later assertion that the study of light avoids human concerns because photons have 'no resting mass, no charge, no controversy on the human scale'.[106] These repetitions serve to reinforce Beard's own assumptions that his particular field of science is separate from the sphere of human influence. However, I would suggest that Beard's confusion regarding whether Appelbaum has vindicated or demolished his position is less a consequence of his chosen field *per se*, and more a symptom of his own failure to develop a nuanced view of how gender, and indeed the human subject more generally, is constructed by social factors. In identifying himself as a scientist he lays claim to an objective perspective that unconsciously reproduces a view of gender as unequivocally a biological concept. But having been forced to re-think these certainties in light of his experience on the committee, he experiences a disruption of the smooth repetition of this supposedly objective perspective. It is this disruption that causes Beard's confusion because it complicates his essentialist view of gender and by

extension his view of an essential human nature. In this way, the narrative draws attention to Beard's narrow objectivity, and to the ways in which it misleads him into the assumption that there is such a thing as an essential human nature that governs the geologic agency of the human subject and its complicity in anthropogenic climate change.

'Colossal Fortunes' and the Post-Normal Science of Climate Change

Beard's essentialist view of a fixed human nature, which we have just seen is complicated in the novel through his perspective on gender, underscores his related tendency to regard the unrestrained consumption of resources by human subjects of modernity as natural. This tendency brings us back to how the particular experience of late-industrial modernity – which the text registers through Beard – is not an objective lens with which to view the era of the Anthropocene. Whilst the novel frames Beard's understanding of the human and geologic historical contexts of anthropogenic climate change in terms of his own claims to scientific objectivity, the narrative also suggests ways in which this understanding is not as objective as Beard assumes it to be. To understand the further implications of this discordance between Beard's supposedly objective view of the conditions that we have been describing as the Anthropocene, and the extent to which this view is shaped by his particular perspective, it is useful to consider more specifically the ways in which any scientific approach to climate change is itself subject to societal and political forces, and indeed to ideological inscription.

Jerome Ravetz and Silvio Funtowicz have provided a theoretical language for articulating the influence of these forces in what they describe as the operation of 'post-normal science'. They use this term to describe a methodology that is specifically applicable within contexts where the 'facts are uncertain, value [is] in dispute, stakes are high and decisions [are] urgent'.[107] Ravetz and Funtowicz specifically align 'post-normal science' to the context of climate change, suggesting it as a methodological response to scenarios where '"hard" policy decisions depend on "soft" scientific inputs'.[108] These inputs are 'soft' because they often lack a robustly characterized scientific knowledge base. This methodological basis of the concept has garnered criticism, particularly in light of incidents such as 'climate gate', with some discourses of climate change denial suggesting that the methodology of post-normal science encourages, or is even the cause of, a 'myth' of climate change.[109] However, Katharine N. Farrell's interpretation of post-normal science appears to re-define it more productively as a diagnostic tool. In Farrell's account, post-normal science provides a way of examining *how* science might tend to operate 'when stakes are high'. In this approach, we can say that science in a given context is operating 'under post-normal conditions'[110] as a consequence of its context, rather than through a deliberate methodological decision to be 'post-normal'. She notes that scientific quality under post-normal science is 'judged

by an extended peer community', one which goes beyond the 'adequacy criteria' of normal science and encompasses a 'value criteria'.[111] In other words, scientific knowledge under these conditions is judged not just on its scientific validity, but also whether it is useful, and whether it is fit 'for a specified purpose'.[112] As this purpose is determined by society, rather than science itself,[113] the judgment of that science becomes subject to social and particularly political ideals as a consequence of these 'post-normal' conditions. I would suggest therefore that this 'value criteria' also hints at the ways in which science under post-normal conditions tends to reproduce anthropocentric perspectives; in being judged according to its societal 'value', post-normal science encompasses those same socialised assumptions that reproduce the dominant political and economic structures in whose interest it is to treat nature as a resource for infinite exploitation.

The post-normal conditions heralded by the contemporary context of anthropogenic climate change are foregrounded in *Solar* in various passages. Beard's account of the genesis of the 'Wind Turbine of Urban Domestic Use' describes the pursuit of the scientific knowledge needed to build it as a cynical attempt to 'procure more funds'[114] from a 'single eye-catching project' rather than a genuine development of a promising area of existing scientific enquiry. Clearly the scientific 'validity' of this project is subordinated to its political and economic value. Later, during his speech to the investors at the Savoy, Beard initially seeks to validate his solar project in terms of its importance as a response to climate change by describing how '[…] burning fossil fuels, putting carbon dioxide and other gases into the atmosphere, is steadily warming the planet […]'.[115] This account of how fossil fuels warm the planet provides a scientifically valid reason for pursuing alternative energy sources. But as he delivers this part of his speech, Beard notes 'dismissive whispers' from the investors. Beard ascribes this response to the City's 'vigorous culture of irrationalist denial, in the face of basic physics and years of good data' and a conviction amongst the investors that 'climate scientists were a self-serving industry, just like themselves'.[116] He therefore changes his approach, focusing instead upon the business opportunities afforded by investing in renewable energy: 'The market will be even more lucrative than coal or oil because the world economy is many times bigger and the rate of change is faster [than during the industrial revolution]. Colossal fortunes will be made'.[117] In contrast to Beard's discussion of 'fossil fuels' and carbon dioxide, the language is now of markets and 'coal or oil'. This change in Beard's language marks a turn from a scientific account of climate change to an account framed in terms of the suitability of this scientific knowledge for the purpose of maintaining the economic system. The science Beard presents is being judged by an 'extended peer community' of investors, and moreover one which is well-versed in the discourses of climate change denial that seek to control the scientific evidence. Science itself is viewed as no more than another form of 'self-serving industry' whose knowledge claims are to be judged according to economic outcomes. The

scientific validity of the solar project as a means of responding to climate change is therefore framed within the narrative as inseparable from these economic interests and assumptions. By relating Beard's speech through a close focalisation upon his internal thoughts as he delivers it, the novel draws attention to the ways in which Beard re-frames the value of his science in terms of a particular economic context. We can read this strategic re-framing of science as indicative of a post-normal condition.

To some extent this subjugation of science to non-scientific discourses and evaluations echoes Donna Haraway's characterisation of social constructivism, in which she describes viewing science as a form of 'rhetoric': as 'a series of efforts to persuade relevant social actors that one's manufactured knowledge is a route to a desired form of very objective power'.[118] This rhetoric serves to mobilize that manufactured or constructed knowledge in the service of increasing and/or maintaining the 'power' of the 'relevant social actors'. We might consider these 'social actors' to include both the consumers within advanced economies – for whom a new scientifically-derived product or practice might be the route to longer life, higher status, or more desirable partners – and the governments of those same economies, for whom science and the technology it enables might provide a route to greater military power, higher GDP, or indeed enhanced energy security.

This account of power complements my re-thinking of Althusser's account of ideology, in that power is maintained through a process of encouraging social actors, in particular Western consumers, to reproduce the manufactured knowledge through which the state institutions achieve greater power. But as we have just seen, the success of this 'rhetoric' to persuade these actors is not dependent upon what Farrell called 'adequacy criteria', but rather upon the perceived 'value criteria' of the scientific knowledge. This dependence upon a 'value criteria' suggests that what Haraway describes as rhetoric is founded upon the effort of scientists to establish the 'value' of their 'constructed knowledge' in the minds of social actors. It is precisely this effort to establish 'value' that we see in Beard's discussion of the 'colossal fortunes' to be made from his solar project.

Indeed, the view of science as rhetoric seems particularly apposite to a reading of *Solar* given Beard's own use of scientific knowledge as a means of obtaining wealth. But this reading of Beard might also seem to suggest that the response to climate change that he develops is nothing more than a means of serving his own motives, which tends to frame science itself as always and already 'self-serving' in the way assumed by the investors at the Savoy. This framing begins to sounds like the strategy of climate change denial I touched upon in introducing the concept of post-normal science, because in emphasising how scientific knowledge can be constructed in the service of economic motives the very validity of climate science as a warning is questioned.[119] The view of science-as-rhetoric may provide insights into Beard's use of rhetoric and the careerist

approach he takes to his pursuit of science. But does this view also tend to ignore the real-world consequences of something like climate change?

'Too much of a rationalist': Beard's Misleading Objectivity and the Subject of the Anthropocene

In considering this question, it is useful to return to Donna Haraway's description of the constructivist view of science as rhetoric, in which she reflects upon the implications of casting science as a form of rhetoric for how we 'talk about reality'.[120] Here, Haraway acknowledges that her account of science as rhetoric might appear to make it difficult to talk about 'reality'. By reality, she appears to mean the material existence of the universe, which would include phenomena such as the biosphere and climate change. But how does one talk about these aspects of 'reality' if all human knowledge about it is a form of rhetoric? Haraway emphasises the need for 'a no-nonsense commitment to faithful accounts of a 'real' world'[121] alongside an account of how that knowledge may nevertheless be socially constructed. This need for the 'real', material world, is born out of a common objective identified by Haraway of both science and feminism, namely 'better accounts of the world'.[122] We can understand these 'better accounts of the world' in terms of what scientists tend to describe as objectivity.

More recently, Haraway has reflected upon some of the ways in which particularly narrow understandings of this objectivity have produced particular ways of thinking about the biosphere that are 'grossly inadequate' for the kind of accounts of the world that are required in the 'urgent times' of anthropogenic climate change.[123] In particular, she argues that the 'Anthropocene's main biological sciences' are those the 'modern evolutionary synthesis', and that these sciences emphasise competition in such a way as to be incapable of accounting for symbiosis.[124] We saw in the previous chapter how thinking about the Anthropocene does not in fact preclude symbiosis, but can actually provide a way of productively re-thinking history so that thinking about the biosphere as 'mesh', the Stengersian assemblage, and the 'becoming with' of symbiogenesis is possible. Nevertheless, Haraway's point does remind us that the ways in which scientists think about the Anthropocene are subject to dominant narratives. These narratives structure how scientists then seek new understandings, so that 'it matters what ideas one uses to think other ideas (with)'.[125] If the scientific knowledge claims with which scientists think about the Anthropocene constitute ideas, then it 'matters' that these ideas are part of an evolutionary synthesis that emphasises competition.

Haraway's idea of science as rhetoric is not therefore a repudiation of the potential of science to make sense of the world. Rather, she attests that any scientific knowledge is

incomplete, and may even hinder more useful understandings when such understandings require ways of thinking that are not accessible through the dominant ideas that formed that knowledge. She therefore draws attention to the need to recognise the 'very historical and material specificity and […] limitations'[126] of the operations that take place within science in relation to the Anthropocene. This specificity is relevant to a reading of *Solar*, because Beard is not, as we have seen, a perfect and disengaged observer of the scientifically knowable objects at stake in the Anthropocene. Beard's understanding of anthropogenic climate change are mediated by his position within the core of the capitalist economy of industrial modernity, and by the technoscientific consumer culture that he embodies. The novel therefore reveals Beard to be an observer of a materially real world that he nevertheless can only view through the anthropocentric enframing of nature that is foregrounded by his embodiment of consumerism.

Yet Beard is clearly unaware of – and uninterested in – the implications of his particular view of the Anthropocene. We have already seen how the narrative ironically undermines Beard's understanding of himself as a rational 'man of science'. It is through this technique that the text signals the facile nature of Beard's belief in his own objectivity. But there is also a much more serious implication of this irony to be found in the way that Beard's belief in this objectivity inoculates him from thinking about the implications of his use of science as rhetoric, and of his submission of that science to the 'value criteria' of post-normal science.

Beard's lack of self-awareness in relation to his scientific outlook can be understood in terms of Sandra Harding's account of 'standpoint theory'.[127] For Harding, 'reason is socially located', beliefs 'have social causes', and 'one's arguments are 'embodied', rather than transcendental'.[128] Harding is referring primarily to the experience of 'historical' struggles: of the embodied experience of living in a patriarchal world that conceptualizes reality in a particular way that is in conflict or divergence with the lived, embodied experience of the marginalized individual. The dominant knowledge system is unaware of these divergences and regards itself as disembodied, objective and neutral, and Harding suggests that this inability to account for marginalized experiences undermines the objectivity of that dominant system.[129]

Beard is not aware of the way in which his knowledge of climate change is embodied; he possesses neither the language nor narrative for thinking through his participation in producing and negotiating what we have seen are the 'value criteria' of his science. His 'standpoint' is that of a privileged, white, upper-middle class western male consumer, who regards himself as 'aggressively apolitical'.[130] Consequently he does not experience any sense of marginalisation, and regards his perspective as both neutral and objective. By reading Beard's lack of self-awareness in terms of standpoint theory, we can understand how his standpoint underpins a crucial epistemological blind spot that leaves him ill-equipped to diagnose the contemporary conditions of the Anthropocene under which he is operating.

The Unwitting Thief and The Unwitting Scientist

This blind spot is underlined in a key scene that ironically contrasts Beard's imagined neutrality and objectivity with his selective and unexamined use of rhetoric and narrative. Immediately following Beard's speech to the investors at The Savoy, Beard is accosted by a 'lecturer in urban studies and folklore' called Jeremy Mellon. Mellon is 'interested in the forms of narrative that climate change has generated',[131] and in this case is particularly interested in an anecdote given by Beard in the speech. Beard's anecdote describes an incident he experienced on a train on his way to the event in which he confronts another passenger for supposedly stealing his crisps. The dénouement of the anecdote reveals that it was in fact the other passenger's crisps that Beard himself was stealing.

Beard uses this anecdote in his speech in an ad-libbed way to make a point about how the disruption of 'unexamined assumptions'[132] can force an individual to re-think their own complicity in a problem, and also that new information can force a reinterpretation of a situation. He uses these points to convince the investors of the need to respond to climate change by investing in his project. However, Mellon claims that the anecdote is in fact a cultural construction known as the 'Unwitting Thief'.[133] He goes on to detail the various forms of this story and to list its common elements. By doing so, Mellon frames the anecdote as a form of rhetorical device with which Beard has sought to convince the investors of the value of his project. But in framing the anecdote in this way, Mellon also claims that the incident did not really happen to Beard and that he was merely repeating a well-studied myth. Because the incident has already been related within the narrative as having actually happened to Beard, Mellon's claim appears to contradict the lived experience of Beard.

Here again McEwan appears to be satirising constructivist approaches to science by depicting cultural constructivism in direct conflict with the 'reality' relayed by the text. Certainly Beard's position as narrative focaliser seems to reinforce this supposed conflict; the text relates his suspicion that Mellon is displaying 'the Nancy Temple tendency' and that people 'who kept on about narrative tended to have a squiffy view of reality, believing all versions of it to be of equal value'.[134] The 'Nancy Temple tendency' is Beard's view that constructivist perspectives ignore the existence of the material reality that his own scientific perspective seeks to objectively describe. By claiming that the anecdote is an example of a cultural myth, Beard feels that Mellon's narrative analysis is denying this reality. Moreover, Beard associates this 'Nancy Temple Tendency' with 'people who kept on about narrative'. For Beard, this obsession with 'narrative' prevents such people from making any distinction between different accounts of 'reality'. Such a lack of

selectivity is anathema to Beard, who lays claim to a scientific rationality and method that he believes does make objective distinctions between competing accounts of reality.

However, whilst the incident of the 'Unwitting Thief' might superficially appear as another example of what Thomas Jones describes as McEwan's 'heavy-handed satire', taking 'pot shots at […] postmodernist cranks who […] whimsically reject the objective truths of science',[135] the fictional status of this satire opens up an ironic distance between Beard's focalisation of events and his own fictional status as a character in a novel. Beard's anecdote, his experience of the incident itself, and Mellon's interpretation, all exist within the fictional world of *Solar* itself. This fictionality draws attention to the means by which Beard's claimed objectivity is articulated through the cultural artefact of the text; a text that is itself a form of narrative. Indeed, the story of the 'Unwitting Thief' occupies a complex metatextual and intertextual position by virtue of being an urban myth acknowledged as such outside of the text.[136] When Mellon notes that the author Douglas Adams used this anecdote in 'a novel in the mid eighties' he is referring to Adams' *So Long and Thanks for All the Fish* (1984) which does contain such a story.[137] Adams famously claimed that the incident had actually happened to him,[138] and McEwan himself was accused of having copied the anecdote from Adams when he gave a reading of this section of *Solar* at the 2008 Hay Literary Festival.[139] The 'reality' or 'unreality' of the story itself is therefore ambiguous. On the one hand its status as a 'true' story within the fictional world of *Solar* might seem to support Beard's view of Mellon as having a 'squiffy view of reality'. On the other hand, we are aware that Beard is himself a fiction and the story really is an urban myth that both Adams and McEwan repeat in fictional contexts, so that the ultimate 'reality' of Beard's anecdote is itself contested.

I would suggest that what this passage of the novel actually satirizes is the implications of Beard's facile belief in his own objectivism. Beard is conspicuously insistent that the story did happen to him, and later reflects that 'Mellon was the real thief, appropriating Beard's genuine experience in order to reduce it to an item of academic interest, a case study in popular delusion'.[140] It is ironic that Beard is complaining here about the very same type of 'appropriation' of reality as a means of understanding 'popular delusion' that he himself was guilty of in his earlier dismissal of climate change as a merely the latest 'beast' 'conjured' by an 'apocalyptic tendency'. Yet despite his apparent concern for re-asserting the authenticity of the story as an account of reality, it is not in fact the 'reality' of his story that is important to his retelling of it. Rather, the real significance of the story for Beard lies in its rhetorical value as an anecdote through which he attempts to narrativise the necessity of his research into solar energy.

This rhetorical value is critical to understanding the facile nature of Beard's belief in his own objectivity. Beard's tendency to mobilise rhetoric is hinted at earlier in the text when the narrator notes that Beard will retell an anecdote from his trip to the arctic in a deliberately

inaccurate way so as not to 'dishonour a good story'.[141] Such rhetorical techniques highlight a 'gift for fabulation' that seems 'at odds with [Beard's] personality as a scientist', as Jan Borm notes.[142] The 'personality as a scientist' Borm refers to here is reminiscent of McEwan's other scientist characters, such as Henry Perowne; Beard's 'gift for fabulation' contrasts with these figures. We see this gift again in Beard's carefully crafted alibi for Tom Aldous' death. The text intimates that this fiction, like that of his arctic anecdote, has become Beard's 'true memory', [143] like 'any genuine recollection'.[144] Through these incidents, the text highlights how Beard's own account of 'reality' – at least in terms of his own lived experience – is in fact constructed by acts of narrative 'fabulation'.

These earlier incidents do not merely cast genuine doubt upon the accuracy of Beard's own version of the 'Unwitting Thief'. They also highlight how Beard's belief in his own objectivity is not only misplaced, but also actively misleads him; his claims of objectivity in response to Mellon serve to obscure not only Beard's own 'gift' for fabulation, but also his willingness to participate in it. In the context of the speech to the investors, this fabulation is framed as a specifically rhetorical strategy through which Beard asserts the 'value criteria' of his project, whilst the actual objective validity of the anecdote itself is only secondary. The rhetorical role of the anecdote underpins the subtle but effective ironic distance between Beard and the narrator in this scene; Beard is himself mobilising narrative's 'squiffy view of reality' to appeal to the investors under the conditions of 'post-normal science' within which his scientific project is embedded. In this way the text draws attention to how Beard makes use of 'fabulation' in order to participate freely and often effectively in the 'value criteria' of post-normal science; yet his view of science as value-free and of himself as objective obscures this participation from him. Like the 'Unwitting Thief' himself, he is unaware that his 'unexamined assumptions' concerning his own objectivity are preventing him from perceiving how his own science is post-normal. This inability or unwillingness to perceive the real conditions under which his science operates prevents Beard from achieving any fully objective understanding of the Anthropocene – at least in the sense of objectivity described by Donna Haraway as 'better accounts of the world'[145] – or from providing a meaningful technoscientific solution to anthropocentric climate change. It is precisely Beard's disregard for the partial and embodied location of his knowledge that the novel ironically foregrounds in the incident of the 'Unwitting Thief'. In doing so, the novel raises profound questions regarding the limits of scientific objectivism as a means both of understanding the implications of the Anthropocene, and of intervening in anthropogenic climate change.

Understanding Ourselves in the Anthropocene

In drawing attention to these limits, *Solar* does not repudiate the value of science in thinking about the real-world consequences of anthropogenic climate change. But the novel does draw attention to how such thinking is marked and misdirected by the anthropocentric assumptions of the cultures of consumerism and industrial modernity within which Beard is entwined. Beard's facile belief in his own objectivity represents an illusory idea of science that can be traced back to the figure of the rational 'man of science' discussed in the earlier part of this chapter. His understanding of this figure is allied to the post-enlightenment tradition of technoscientific progress and industrial modernity of which it is a part. It is because Beard views himself as this figure from the standpoint of a white professional male scientist that he has no call to question its authenticity. This inability to critique his own objectivity accounts for why Beard can plagiarise Tom Aldous' work, pursue his strategic use of the academic publishing system, and embrace the financial motives and strategies that underpin his solar project, without appearing to recognise that by doing so he is acting in opposition to the figure of a scientist that he valorises and claims to embody. It is by representing the ironic distance between his faith in his own scientific objectivity and the anthropocentric reality of his solar project that the novel relays the full extent of that which Beard himself does not have the language for; his own complex, anthropocentric, and culturally-located implication in the Anthropocene.

By underlining how Beard's limited understanding of himself as a scientist living in the Anthropocene is the result of a particular contemporary standpoint – post-industrial, Western, and consumerist – I would suggest that the novel invites the reader to think through and beyond McEwan's own call that 'we understand ourselves a little more, even if we accept that we can never really change our natures'.[146] Rather than seek to understand a universal and unchanging 'us', as this call seems to imply, the novel suggests that 'we' should understand how that notion of 'ourselves' is itself brought into being through the complex interdependence between an unequal human history and the geological availability of 'coal and oil'. It is through this interdependent history that the contemporary human subject of modernity has come to be, and it is through this being that they manifest geologic agency. By maintaining the ironic distance between Beard's claim to a neutral and objective approach to anthropogenic climate change and its solutions, and the ways in which his understanding of his own relationship with the biosphere is marked by his embodiment of consumer society and participation in post-normal science, the novel encourages the reader to understand Beard as a subject who has 'become with' the industrial modernity of the Anthropocene.

The novel's depiction of Beard in this way ultimately suggests that the problem of anthropogenic climate change does not only lie with the technological processes of industrial

modernity that produce CO2, nor solely with the dependency of nations and individuals on fossil fuels. Beard understands these aspects of climate change, and as we have seen deliberately frames his solar project to meet the value criteria that such aspects demand. What the novel's satirical account of Beard reveals is the importance of how anthropogenic climate change is thought about. Despite Beard's knowledge, his ability to think about anthropogenic climate change and its solutions through the otherwise neutral lens of science is structured by his standpoint, and that standpoint is itself a product of the ideology of industrial modernity, which we have seen has anthropocentric foundations. It is this standpoint that dissuades Beard from contemplating how his attempt to intervene in anthropogenic climate change through the solar project itself naturalises the impulse to exploit and consume nature – to anthropocentrically enframe it as a resource – by framing this impulse as a part of a fixed, innate, and universal human 'nature'. It is precisely Beard's inability to account for this standpoint that forecloses any possibility of his understanding the ways in which his solution to climate change is structured by his own anthropocentric assumptions and the industrial modernity of which he is a part. This inability marks the limits of Beard scientific understanding for meaningfully intervening in the biosphere; a failure that has potentially apocalyptic consequences.

In drawing attention to how Beard's understanding is limited in this way, the text complicates Chakrabarty's call for a 'conversation'[147] between the scientific account of geologic history and the historical understanding of human history. The text suggests that the two histories are not in fact as insulated from each other in the contemporary context as he assumes. We have seen echoes of a conversation between these histories in how Aldous' view of the human history of modernity marks his understanding of the geologic history of fossil fuels, and how Beard imagines the spread of the city as a 'lichen'. Furthermore, Beard's journey from his initial scepticism about climate change to the solar project traces an emerging contemporary awareness of how these histories are linked. But this awareness is structured by his standpoint. As he begins to think seriously about anthropogenic climate change, so too does he frame that thinking as a means of perpetuating his own exploitation of nature. The consumerist 'thoughts' of a privileged subject of industrial modernity with which Beard 'thinks thoughts' about human and geologic history prevent him from fully understanding either himself or his complexly interdependent implication in the Anthropocene. It is as a both scientist and as a consumer that Beard has been 'made' by coal and gas, and this making simultaneously marks and obscures his geologic agency. The timely warning behind the 'joke' that is the novel's satirical depiction of Professor Beard is that the contemporary human subject of industrial modernity is not just a cause of the Anthropocene, but also a consequence of it.

[1] Cape Farewell, 'About Cape Farewell', <http://www.capefarewell.com/about.html> [accessed 10th September 2011].
[2] David Amigoni, '"The luxury of storytelling": Science, Literature and Cultural Contest in Ian McEwan's Narrative Practice', in *Literature and Science*, ed. by Sharon Ruston (Cambridge: D. S. Brewer, 2008), pp. 151-67 (p. 154).
[3] Ian McEwan, *Solar* (London: Jonathan Cape, 2010), p. 285.
[4] Ian McEwan, 'A Boot Room in the Frozen North', <http://www.capefarewell.com/climate-science/comment-opinion/ian-mcewan.html> [accessed 1 June 2014].
[5] McEwan, 'A Boot Room in the Frozen North'.
[6] McEwan, 'A Boot Room in the Frozen North'.
[7] Heise, p. 205.
[8] McEwan, 'A Boot Room in the Frozen North'.
[9] Greg Garrard, 'Ian McEwan's Next Novel and the Future of Ecocriticism', *Contemporary Literature*, 50 (2009), 695-720 (pp. 705-6) <http://dx.doi.org/10.1353/cli.0.0090>.
[10] Dipesh Chakrabarty, 'The Climate of History: Four Theses', *Critical Inquiry*, 25 (Winter 2009), 197-222 (p. 214). I also discussed this in Chapter 3.
[11] Evi Zemanke, 'A Dirty Hero's Fight for Clean Energy: Satire, Allegory, and Risk Narrative in Ian McEwan's *Solar*', *Ecozone*, 3 (2012), 51-60 (p. 57) <http://www.ecozona.eu/index.php/journal/article/view/219/512> [accessed 27 November 2014].
[12] McEwan, *Solar*, p. 79-80.
[13] McEwan, *Solar*, p. 66.
[14] M. John Harrison, 'Ian McEwan's use of renewable resources', *The Times Literary Supplement*, 24 March 2010 <http://entertainment.timesonline.co.uk/tol/arts_and_entertainment/the_tls/article7073694.ece> [accessed 27 August 2011].
[15] Harrison, 'Ian McEwan's use of renewable resources'.
[16] McEwan, *Solar*, p. 10
[17] McEwan, *Solar*, p. 10.
[18] Harrison, 'Ian McEwan's use of renewable resources'.
[19] McEwan, *Solar*, p. 96.
[20] Harrison, 'Ian McEwan's use of renewable resources'.
[21] Ian McEwan, *Saturday* (London: Vintage, 2005), p. 96.
[22] McEwan, *Saturday*, p. 278.
[23] McEwan, *Saturday*, p. 180.
[24] Thomas Jones, 'Oh, the Irony', *London Review of Books*, 32 (25 March 2010) <http://www.lrb.co.uk/v32/n06/thomas-jones/oh-the-irony> [accessed 27 August 2011]. Jones links this tendency to an account of an incident at a book reading in 1997 in which McEwan suggested that a mathematician who does not always think like a mathematician cannot be a very good one. This suggests that McEwan views thinking 'like scientists' to be a realistic characteristic of scientists, or at least of the 'good' ones.
[25] Jones, 'Oh, the Irony'.
[26] Jones, 'Oh, the Irony'.
[27] McEwan, *Solar*, p. 96.
[28] McEwan, *Solar*, p. 166.
[29] For a concise discussion of the effect of this type of narrative distancing, see Steve Cohan and Linda M. Shires, *Telling Stories: A Theoretical Analysis of Narrative Fiction* (London: Routledge, 1988), pp.101-2.
[30] McEwan, *Solar*, pp. 14-5.
[31] McEwan, *Solar*, p. 14.

[32] McEwan, *Solar*, p. 16.
[33] This myth might also be thought of in terms of the 'lie' of figural language to which Paul De Man refers when he describes Nietzche's account of how the 'repeated use' of such language produces a 'false literalism'. Indeed, it is a belief in the literal reality of this figure that marks Beard's illusory view of himself. See Paul De Man, *Allegories of Reading: Figural Language in Rousseau, Nietzsche, Rilke, and Proust* (New Haven, CT: Yale University Press, 1979), pp. 110-12.
[34] McEwan, *Solar*, p. 15.
[35] McEwan, *Solar*, pp. 15-6.
[36] McEwan, *Solar*, pp. 16.
[37] McEwan, *Solar*, p. 15.
[38] McEwan, 'A Boot Room in the Frozen North'.
[39] Indeed, McEwan's use of 'ourselves' is suggestive of the problematic species thinking highlighted by Isabelle Stengers and others, and discussed previously.
[40] McEwan, *Solar*, p. 3.
[41] McEwan, *Solar*, p. 146.
[42] McEwan, *Solar*, p. 146.
[43] McEwan, *Solar*, p. 148.
[44] McEwan, *Solar*, p. 148.
[45] Martin Amis, *Money: A Suicide Note* (London: Vintage, 2011), p. 176.
[46] Amis, p. 5.
[47] McEwan, *Solar*, p. 118.
[48] McEwan, *Solar*, p. 118.
[49] Max Ajl, 'To Reduce Climate Change, Reduce Consumption', *Inside Climate News*, 30 August 2009, <http://insideclimatenews.org/news/20090830/reduce-climate-change-reduce-consumption> [accessed 12th June 2011].
[50] McEwan, *Solar*, p. 145.
[51] Slavoj Žižek, *Living in the End Times* (London: Verso, 2011), pp. 333-35 (p. 335).
[52] Žižek, *Living in the End Times*, p. 335.
[53] Žižek, *Living in the End Times,* p. 335.
[54] Though note that Žižek has previously provided a detailed re-thinking of Marx's concept of ideology that emphasises the 'unconsciousness illusion' of what he calls an '*ideological fantasy*', particularly in terms of subjects who 'know how things really are', but still proceed 'as if they did not know'. See Slavoj Žižek, *The Sublime Object of Ideology* (London: Verso, 1989), pp. 32-3.
[55] Ingolfur Blühdorn, 'Sustaining the Unsustainable: Symbolic Politics and the Politics of Simulation', *Environmental Politics*, 16 (2007), 251–75 (p. 272).
[56] Rebecca Tuhus-Dubrow, 'Cli-Fi: Birth of a Genre', *Dissent*, 60 (2013), 58-61 (p. 60) <http://dx.doi.org/10.1353/dss.2013.0069>.
[57] McEwan, *Solar*, p. 26.
[58] McEwan, *Solar*, p. 27.
[59] Isabelle Stengers, 'Gaia, the Urgency to Think (and Feel)', *The Thousand Names of Gaia, From the Anthropocene to the Age of the Earth*, (2014), p. 4 <https://osmilnomesdegaia.files.wordpress.com/2014/11/isabelle-stengers.pdf> [accessed 25 January 2015].
[60] Stengers, 'Gaia, the Urgency to Think (and Feel)', p. 4. Stengers specifically cites geoengineering, but her description of how technoscientific solutions are framed as continuations of human progress is also reminiscent of Aldous' framing of his proposed 'new fuel'.
[61] McEwan, *Solar*, p. 186.
[62] McEwan, *Solar*, p. 27.
[63] McEwan, *Solar*, p. 27.
[64] De Man, pp. 110-112.
[65] McEwan, *Solar*, p. 153.

[66] Carson's allusion to a springtime without birdsong – the 'sudden silencing of the song of birds' – is a powerful image of a biosphere disrupted by human activity. See Rachel Carson, *Silent Spring* (New York, NY: Mariner Books, 2002), p.103.
[67] McEwan, *Solar*, p. 153.
[68] Stengers, 'Gaia, the Urgency to Think (and Feel)', p. 4.
[69] McEwan, 'A Boot Room in the Frozen North'.
[70] McEwan, *Solar*, p. 26.
[71] McEwan, *Solar*, p. 110.
[72] McEwan, *Solar*, p. 111.
[73] Timothy Morton, *The Ecological Thought* (Cambridge, MA: Harvard University Press, 2010), pp. 33-4.
[74] McEwan, *Solar*, p. 107.
[75] Isabelle Stengers, Heather Davis and Etienne Turpin, 'Matters of Cosmopolitics: on the Provocations of Gaïa', in *Architecture in the Anthropocene: Encounters Among Design, Deep Time, Science and Philosophy*, ed. by Etienne Turpin (Ann Arbor, MI: Open Humanities Press, 2013) <http://dx.doi.org/10.3998/ohp.12527215.0001.001>.
[76] Stengers, 'Gaia, the Urgency to Think (and Feel)', p. 4.
[77] Stengers, 'Gaia, the Urgency to Think (and Feel)', p. 4.
[78] McEwan, *Solar*, p. 193.
[79] McEwan, *Solar*, p. 127.
[80] McEwan, *Solar*, pp. 8-9.
[81] Chakrabarty, 'The Climate of History', p. 212.
[82] Chakrabarty, 'The Climate of History', pp. 213-4.
[83] Alan Sokal, 'Transgressing the Boundaries: Towards a Transformative Hermeneutics of Quantum Gravity', *Social Text*, 46/47 (Spring/Summer 1996), 217-52.
[84] Paul R. Gross and Norman Levitt, *Higher Superstition: The Academic Left and its Quarrels with Science* (London: John Hopkins Press, 1994), pp. 69-70.
[85] Richard Dawkins, 'Postmodernism Disrobed', *Nature*, 394 (July 1998), 141-3 (p. 143).
[86] Andrew Ross, 'Introduction', *Social Text*, 46/47 (Spring/Summer 1996), 1-13 (pp. 5-6).
[87] Stanley Aronowitz, 'The Politics of the Science Wars', *Social Text*, 46/47 (Spring/Summer 1996), 177-97 (p. 179).
[88] McEwan, *Solar*, p. 132.
[89] Dawkins, 'Postmodernism Disrobed', p. 143.
[90] McEwan, *Solar*, p. 131.
[91] Sandra Harding, 'Science is "Good to Think With"', *Social Text*, 46/47 (Spring/Summer 1996), 15-26 (p. 16).
[92] Ross, 'Introduction', p. 12.
[93] Aronowitz, p. 180.
[94] McEwan, *Solar*, p. 133.
[95] McEwan, *Solar*, p. 138.
[96] Jones, 'Oh, the Irony'.
[97] Amigoni, p. 154.
[98] Amigoni, p. 154.
[99] McEwan, *Solar*, p. 138.
[100] McEwan, *Solar*, p. 139.
[101] McEwan, *Solar*, p. 139.
[102] McEwan, *Solar*, p. 139.
[103] McEwan, *Solar*, p. 140.
[104] McEwan, *Solar*, p. 140.
[105] McEwan, *Solar*, pp. 8-9.
[106] McEwan, *Solar*, p. 144.

[107] Silvio O. Funtowicz, Jerome R. Ravetz, 'A New Scientific Methodology for Global Environmental Issues', in *Ecological economics: the science and management of sustainability*, ed. by Robert Costanza (New York: Columbia University Press, 1991), pp. 137-52 (p. 137).
[108] Funtowicz and Ravetz, p. 137.
[109] See for example James Delingpole, 'The real reason for AGW: Post Normal Science', *Daily Telegraph*, 27 February 2010 <http://blogs.telegraph.co.uk/news/jamesdelingpole/100027748/the-real-reason-for-agw-post-normal-science/> [accessed 17 September 2011].
[110] Katherine N. Farrell, 'The Politics of Science: Has Marcuse's New Science Finally Come of Age?', in *Critical Ecologies: The Frankfurt School and Contemporary Environmental Crises*, ed. by Andrew Biro (London: University of Toronto Press, 2011), pp. 73-107 (p. 85).
[111] Farrell, p. 85-6.
[112] Farrell, p. 86.
[113] Farrell, p. 86.
[114] McEwan, *Solar*, p. 23.
[115] McEwan, *Solar*, p. 149.
[116] McEwan, *Solar*, p. 150.
[117] McEwan, *Solar*, p. 153.
[118] Donna Haraway, 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective', *Feminist Studies*, 14 (Autumn 1988), 575-99 (p. 577).
[119] See also Bruno Latour's concern for how 'dangerous extremists are using the very same argument of social construction to destroy hard-won evidence [of climate change] that could save our lives'. Bruno Latour, 'Why Has Critique Run Out of Steam? From Matters of Fact to Matters of Concern', *Critical Inquiry*, 30 (Winter 2004), 225-48 (p.227) <http://dx.doi.org/10.1086/421123>.
[120] Haraway, 'Situated Knowledges', p. 575.
[121] Haraway, 'Situated Knowledges', p. 579.
[122] Haraway, 'Situated Knowledges', p. 590.
[123] Haraway, *Anthropocene, Capitalocene, Chthulucene*.
[124] Haraway, *Anthropocene, Capitalocene, Chthulucene*.
[125] Marilyn Strathern, *Reproducing the Future: Essays on Anthropology, Kinship and the New Reproductive Technologies* (Manchester: Manchester University Press, 1992), p. 10. Haraway frequently draws upon this insight.
[126] Haraway, *Anthropocene, Capitalocene, Chthulucene*.
[127] Like Haraway, Sandra Harding approaches the philosophy of science from a feminist perspective that is specifically concerned with the interface between science and gender.
[128] Sandra Harding, *Whose Science? Whose Knowledge?: Thinking From Women's Lives* (New York: Cornell University Press, 1991), pp. 184-5.
[129] Harding, p. 141.
[130] McEwan, *Solar*, p. 39.
[131] McEwan, *Solar*, p. 147.
[132] McEwan, *Solar*, p. 155.
[133] McEwan, *Solar*, p. 157.
[134] McEwan, *Solar*, p. 147.
[135] Jones, 'Oh, the Irony'.
[136] See for example the entry on Snopes, the online repository of urban myths: Barbara Mikkelson, 'Pinched Cookies', <http://www.snopes.com/crime/safety/cookies.asp> [accessed 26 November 2014].
[137] Douglas Adams, 'So Long, and Thanks for All the Fish', in *The Hitch Hiker's Guide to the Galaxy: A Trilogy in Five Parts* (London: William Heinemann, 1995), pp. 461-590 (pp. 530-32).
[138] Mikkelson, 'Pinched Cookies'.

[139] Christopher Priest, 'Solar – Ian McEwan', <http://www.christopher-priest.co.uk/reviews/1320/solar-ian-mcewan-2010-jonathan-cape-18-99-isbn-978-0-224-09049-0/> [accessed 10 September 2014].
[140] McEwan, *Solar*, p.187.
[141] McEwan, *Solar*, p. 71.
[142] Jan Borm, 'Ian McEwan's *Solar*, or Literature and Contemporary Debates on Climate Change', in *Literature in Society*, ed. by Regina Rudaitytė (Newcastle upon Tyne: Cambridge Scholars Publishing, 2012), pp. 237-47 (p. 246).
[143] McEwan, *Solar*, p. 71.
[144] McEwan, *Solar*, p. 96.
[145] Haraway, 'Situated Knowledges', p. 590.
[146] McEwan, 'A Boot Room in the Frozen North'.
[147] Chakrabarty, 'The Climate of History', p. 219.

Conclusion

In drawing attention to how the contemporary human subject of industrial modernity can be thought of not just as a cause of the Anthropocene but also as a consequence of it, the figure of Professor Beard highlights how the difficulty of understanding the crisis of anthropogenic climate change is not only one of scale and complexity. There is also a problem of understanding how individuals – or at least the human subjects of Western consumer society to whom *Solar* appears to be principally addressed – manifest the Anthropocene in the very structuring of their ways of thinking about humanity and the biosphere. This understanding is particularly challenging precisely because of the ways in which the biosphere is thought of as an object of human exploitation. This thinking tends to frame anthropogenic climate change in an immediately anthropocentric way, so that the problem is imagined as one of finding new and better ways to exert human power over nature.

The emphasis on a human subject taming the objectified biosphere in order to better enframe it as a resource, to which Isabelle Stengers' alludes when describing the 'good anthropocene', obscures the complex feedback relations of co-creation implicit in Donna Haraway's emphasis on 'becoming with'. But by imagining an outcome of this 'becoming with' through the obese and self-destructive figure of Beard, *Solar* presents the reader with a figure who is both the cause and effect of the Anthropocene. This in turn encourages the reader to reflect upon their own tendencies towards anthropocentric thinking about anthropogenic climate change. Beard's view of southern England is not only a view of a landscape transformed by human history; it is also a landscape that has created him.[1] In this way, the reader is encouraged to think of the human under industrial modernity not simply as a subject whose knowledge can enact a technoscientific solution to anthropogenic climate change, but rather as a complexly interdependent element of a biosphere undergoing a transformation that has apocalyptic implications. Beard's failure to attend to these implications questions his anthropocentric faith in the viability of technoscientific culture, and underlines the need to think about the relationship between humans and the biosphere in ways quite different to that which such faith assumes and encourages.

Solar's rendering of interdependent transformation is itself reminiscent of the ways in which Kerans is depicted as an individual 'becoming with' a new geologic era in *The Drowned World*. The changes Kerans experiences are of course non-anthropogenic consequences of an event exterior to human modernity. This difference can tend to obscure the shared sense between the two novels that what we think of as human history and geologic history are interconnected. That both novels express this idea through quite different literary techniques –

and also to different ends – is significant. *Solar* states the problem through a satire that ultimately depicts Beard and the consumer cultures of industrial modernity that he represents as a tragic figure trapped in an unsustainable cycle. *The Drowned World* however not only encourages the reader to confront the temporary and historical contingencies of industrial modernity, but also to think through the unfamiliar conditions of being human within the biosphere that are relayed through Kerans' traumatic rebirth.

Such defamiliarisation is central to how fiction can contribute to understanding anthropogenic climate change. This thesis began with the contention that human subjects of industrial modernity are discouraged from thinking about themselves as anything other than the legitimate masters and exploiters of an objectified biosphere. The question then was how literary fiction might help readers to think through this relationship in new and productive ways, specifically by imagining the complex interdependencies between the human species and the geologic history of the planet, and the ways in which such interdependencies complicate the uses to which science can be put in explaining and intervening in the biosphere. The subsequent close-readings in each of the six case-studies have answered this question by identifying how these critical acts of rethinking are encouraged by literary techniques that defamiliarise the assumed stability of spatial, temporal, and scientific coordinates of anthropocentric thinking, and which disrupt their repetition. Such disruption is acutely represented in the texts in a variety of imaginative ways: in Kerans' experience of the entwining of human and geologic history in the apocalyptic encounter with the flooded planetarium in *The Drowned World*; in Wayne's rejection of the hallucinatory 'Mickey Mouse watch' of twentieth-century American modernity in *Hello America*; and in the man's encounter with the can of Coca-Cola that is rendered as uncanny by the disrupted space-time of *The Road*. These repetitions are also disrupted by Jonah's narrative of *karass* as a way of understanding the apocalyptic outcome of *ice-nine* in *Cat's Cradle*; the dual narrative of human and geologic history that self-consciously intrudes upon the limited perspectives of big-brained humans in *Galapagos*; and Professor Beard's ultimate failure to live up to his self-professed objectivity in claiming to intervene in the biosphere in *Solar.* By reading these texts through the distinct critical framework developed in this thesis, we can see how each of these imaginative interventions, and the others I have identified in the close readings of each novel, reveal and disrupt the repetition of the anthropocentric foundations of ideology; the enframing of nature as a resource and the consequent and artificial separation of the human subject from the biosphere that is naturalised in the service of industrial modernity.

It is through the particular speculative narrative and generic resources of science and apocalypse that these texts offer literary expressions of the 'missing thought experiments' described by Isabelle Stengers; the imaginative 'what if' scenarios that enable readers to think through and even beyond the insights that are provided by the scientific, historical, and

philosophical theories upon which I have drawn in this thesis. In *Solar* these moves are realised through Beard's allegorical figuring as a scientist who embodies the naturalised desires and excesses of consumer society. His ironic representation by the text draws critical attention to how his narrow sense of scientific objectivity leaves him ill-equipped to think through this contradiction. But whilst the novel provides a particularly nuanced account of both the uses and limits of science for thinking about anthropogenic climate change, it stops short of depicting the apocalyptic outcomes that are implied by Beard's failures.

By contrast, the apocalyptic re-ordering of the biosphere through *ice-nine* in *Cat's Cradle* offers an alternative fictional world that imagines how the anthropocentric enframing of nature through technology can give rise to a new geologic era. Like *Solar*, the novel depicts a scientist character who appears to affirm a facile and anthropocentric belief in the promise of technoscience to intervene in the biosphere. But whilst the danger of this facile belief is not ultimately fulfilled within the narrative of *Solar,* Vonnegut offers a glimpse of its apocalyptic outcomes. As Jonah's narrative traces the complex interactions through which an environmental apocalypse unfolds in the absurd events of the plot, the ending itself casts the ironic distance established between the various framings of Hoenikker and Jonah's own narration with a sudden dramatic urgency that underlines the dangerous implications of anthropocentric thinking.

In contrast to the final climax of this apocalyptic end, Ballard's *Hello America* offers a more fully developed apocalyptic world in which the human history of industrial modernity – and thus the story of capital – has fallen back from its own unsustainable level of excess. Wayne's journey across America in pursuit of his own particular 'American Dream' powerfully demonstrates the ways in which the ideology of this unsustainable modernity was maintained by an anthropocentric foundation. In depicting how Wayne continues to think of the biosphere as an infinite resource for human exploitation, the novel anticipates *Solar*'s depiction of a fictional character who remains in thrall to the technoscientific promises of industrial modernity despite pressing environmental crises.

All three of these novels therefore highlight the dangers of anthropocentric thinking, which legitimises the enframing of nature as a resource by privileged human subjects in the Anthropocene. But it is also clear from my analysis of these novels that the other three texts I have analysed go even further in offering a way to think through alternative ways of understanding human existence within the biosphere. As we have seen, the inventive *longue durée* through which the future history of the fisherfolk unfolds in *Galapagos* brings together scientific perspectives on the evolutionary relationship between human and biosphere with a fictional narrative of human history that undermines the privileged status of the human and questions the notion of 'humanity' itself. In this way, the speculative future history of *Galapagos* presents a particularly useful means of thinking through what we now term the Anthropocene in

ways that account for and develop some of the criticisms of that idea. The future history of the fisherfolk is a scientific species history over geologic time that – rather than recapitulating species thinking – actually questions the very idea of 'species'. At the same time, this future history is also that of a globalised story of capital finally succumbing to its own contradictions. But this story of capital is itself framed by Trout's narrative as merely one transitory and illusory moment in a far longer human history. These differing perspectives of history, which appear as contradictions in critical debates surrounding the Anthropocene, are here imagined as a particularly inventive and nuanced constellation of scientific and historical ideas through which the novel develops. By exploring these ideas through the conventions of fiction, *Galapagos* anticipates both the Anthropocene's emphasis on entwining geologic and human histories, and the difficulties of representing this entwining though human perspectives that can appear misleadingly transcendent of history. It is through the novel's particular use of a 'ghostly' first-person narrator that the contemporary reader is encouraged to think about the relationship between human and biosphere as a process of 'becoming with', whilst also marking the limits of such scientific insights to explain and provide solutions to anthropogenic climate change.

A different kind of inventiveness underpins the apocalyptic narrative of *The Road*. In this novel, the contrast between the world of the Anthropocene – with all its anthropogenic markers of time and space – and a speculative post-Anthropocene world in which these markers are framed as vestigial remnants of a temporary epoch, registers a traumatic and disorientating encounter with an experience of nature that is reminiscent of the Lacanian 'real'. This traumatic encounter is registered through the subversive re-imagining of the world without biosphere, in which all of the human ways of enframing the world – politically, technoscientifically, cartographically – have been destroyed. The text inventively reflects this transformation of the human relationship with the biosphere through McCarthy's use of techniques such as grammatically sparse sentence structures and seamless shifts in perspective that create an uncanny sense of a non-anthropocentric and indeed post-human world. This fictional world suggests more than just a representation of the end of a human history of modernity or a history of the biosphere. Instead, the novel demands that the reader imagine the human as an anachronistic irrelevance in the vast space-time of an indifferent universe.

It is the speculative questions posed and explored by these inventive perspectives on the human relationship with the time and space of the biosphere that mark both *Galapagos* and *The Road* as particularly powerful texts for thinking through the Anthropocene and understanding its implications for thinking about anthropogenic climate change. A similarly inventive perspective is evident in Ballard's *The Drowned World*, in which the distinctly Ballardian themes of tenuous civilisation and psychodrama are mobilised in Kerans' journey back through 'archaeopsychic time'. This imaginative way of describing and depicting time does more than simply show how human

history is entwined with geologic history. It destabilises the anthropocentric solidity of everything that is assumed to define the human in relation to the biosphere: technoscientific progress, dominion over nature, resource exploitation, and the categorising and structuring of the world through human knowledge. Kerans' ultimate decision to journey south is a stark depiction of the rejection of all of these assumptions in light of his emergent ecological consciousness. But the most powerful and destabilising of the novel's speculations lies in its suggestion that Kerans' choice exists at all.

We can see that all six of the texts examined in this thesis contribute to a complex and disruptive understanding of anthropogenic climate change. But it should be clear from the above that three of these texts stand out in the way that they work through the questions of human interdependency on the biosphere – individually and collectively, biologically and historically – that I have suggested are posed by the Anthropocene. The imaginative psychological transformation of the human subject in *The Drowned World*; the uncanny subversion of familiar chronotopes and literary form in *The Road*; and the evolutionary space-time of Trout's 'hoped for' apocalypse of *Galapagos*. These three texts in particular not only demand a recognition of the anthropocentrism that underpins the 'ideas' with which we otherwise attempt to think about anthropogenic climate change.[2] Through the speculative fictional worlds they depict and the particular literary techniques they employ, these texts also draw the reader into alternative ideas with which to think about the human and the biosphere.

In doing so, each of these texts might be understood as constituting a particular strand of what could be broadly described as climate change fiction. Yet whilst such a term might provide a useful way of collectively referring to these texts, the diversity of narrative forms, of tone, and of generic conventions, that can be identified in each of them highlight the extent to which there is no one mode of literary 'response' to anthropogenic climate change. Clearly, the different problems involved in thinking about this crisis demand different responses. But if a common thread identified in the analysis of these texts has been a concern for complex interconnections between human individuals, societies, and the biosphere – albeit over differing timescales and in diverse ways – then the different ways in which the texts have imagined and explored this interconnectedness also reflects the differing ways in which it takes form. And it is the variety of ways in which such interconnectedness is manifested in anthropogenic climate change that makes it easy to be mislead by scientific, historical, or philosophical analyses that might lay claim to complete or universal understandings. Indeed, one of the challenges presented by anthropogenic climate change is the way in which thinking about the problem in a particular way – even if that way is productive and useful – can tend to obscure other critically important aspects of the crisis. This challenge is something to which Donna Haraway gestures when she invokes the 'modern synthesis' of evolutionary theory in her discussion of the Anthropocene. Haraway proposes a

need to recognise what these theories 'can do, can't do…and what they stopped'.[3] This suggests that a way of thinking about the human can be simultaneously useful, enlightening, limited, and also function to obscure. The Anthropocene is similarly framed by Haraway in terms of both the useful 'kinds of operations that go on under [it]', and its 'limitations'.[4] As discussed in the Introduction, criticisms of the Anthropocene can also betray a set of assumptions on the part of the critic as much as they point to an intrinsic problem with the concept. But the power of these assumptions to colour critical understandings of the Anthropocene highlights how thinking about anthropogenic climate change tends to involve thinking with existing – and often anthropocentric – ideas. Haraway's repeated references to Marilyn Strathern's assertion that 'it matters what ideas one uses to think other ideas (with)'[5] has perhaps never been more true or urgent than in the context of anthropogenic climate change.

It is such ideas, specifically those reproduced by the familiar apocalyptic narratives and the figures of the hero scientist, which marked the ultimate technoscientific triumphalism of the examples of conventional fictions of climate change discussed in the introduction: *The Black Cloud* and *The Day After Tomorrow*. And it is by subverting and inventively re-working these conventions that the six texts discussed here help readers to think through the questions and implications of anthropogenic climate change – with ideas that come into focus around the contested idea of the Anthropocene. Significantly, none of these six texts forecloses a final answer to the threat of anthropogenic climate change. Rather, they contribute to a complex and interrelated web of ideas that call into question the faith in human technoscientific agency to diagnose and respond to this threat, and speculate upon the apocalyptic consequences of this faith. The apocalypse of *The Drowned World* for example helps us to think about the individual experience of what we might term 'being with' a changing biosphere, but in disappearing into the 'forgotten paradises of the reborn sun'[6] Kerans' narrative suggests an unexpected futurity in which the apocalyptic ending of modernity is coeval with a re-birth of the human. If the bleak *avenir* of *The Road* helps us to imagine a post-human world, then it still leaves the category of the human itself undisturbed; it is *homo sapiens sapiens* that will finally 'wink out forever'.[7] By contrast, whilst *Galapagos* does not finally depict the end of the human, it does interrogate scientific formulations of the idea of the human itself. Trout is both a *homo sapiens sapiens* and not a *homo sapiens sapiens*; the fisherfolk are 'people' but not as we know them. It is perhaps this need to confront and think through that which the reader might take for granted about 'being' human in their relationship with the biosphere that constitutes one of the most pressing and urgent contributions that literary fiction can make in response to anthropogenic climate change.

The key implication of the six case studies conducted in this thesis is therefore that the imaginative resources of literary fiction – in particular those of narrative irony, the depiction of radically altered space-time, and the speculative unfolding of future histories – can assist readers

in thinking in urgent and profoundly different ways about the causes and implications of anthropogenic climate change. The need for these different ways of thinking is gestured towards in evolutionary and ecological accounts of the biosphere, in the historiographical reflections on the Anthropocene of Chakrabarty and others, and in the philosophy of science of Haraway and Stengers. But it is through the imaginative capacity of fiction to draw attention to its own narrative limitations in relating and disrupting scientific and historical ways of thinking, and to speculate upon the outcomes of these ways of thinking in narratives that resist foreclosure, that the literary texts discussed in this thesis encourage readers to think through and beyond the new ways of thinking suggested by recent debates surrounding the Anthropocene. In considering the particular contribution of these texts then, it is useful to re-imagine Stengers' notion of how 'scientific' stories can intrude upon the 'deeply ingrained habits of thought' of individuals living under modernity'.[8] It is the specific narrative intrusions of the *fictional* stories represented by the texts examined here – whether through quasi-scientific apocalyptic speculations on the unfolding of post-Anthropocene worlds, or imaginative critiques of the scientific thinking that today seeks to otherwise explain the Anthropocene itself – that underscore their contribution to thinking differently about anthropogenic climate change.

Further Investigations

This contribution must however be understood within the wider context of climate change in literature. As Adam Trexler has recently noted in his book *Anthropocene Fictions* – published as this thesis was being written up – the corpus of such fiction represents 'an enormous and growing archive'.[9] Yet as discussed in the Introduction, the scope of this thesis was necessarily selective in order to enable the close readings and sustained analysis conducted in each case study. The particular limits of this scope were also determined by my specific focus upon texts written from within the core of the global system of capital that perpetuates industrial modernity, and which manifests the dominant ways of thinking that I have suggested are so heavily implicated in both the unfolding and understanding of anthropogenic climate change. Yet, it is also clear that the texts selected for inclusion as case studies represent only one specific part of a much broader archive of texts that could reward analysis of the kind I have conducted, some of which I have mentioned in the course of this thesis. This archive includes other texts from the core of the global system of capital that variously speculate on different apocalyptic outcomes, such as Margaret Atwood's *Oryx and Crake* (2003), T.C. Boyle's *A Friend of the Earth* (2000), George Turner's *The Sea and Summer* (1987), John Christopher's *The Death of Grass* and Brian Aldiss' *Hothouse* (1961). Whilst these texts exhibit concerns and techniques that overlap with the texts featured in the case studies, they also make use of differing techniques not included in the scope

of this thesis. For example Atwood's 'crakers' represent a speculative imagining of a specific kind of 'post-humans' in which the 'evolution' of the human body itself is imagined as a particular outcome of technoscience. Close analyses of how the particular use of differing techniques such as these can also be read as ways of critiquing the effects of anthropocentric thinking on the directing of science, or of depicting the entwining of geologic and human history, are potentially fruitful areas for further investigation.

Similarly, whilst the methodological decision to conduct sustained readings of a select group of individual texts by different authors effectively excluded a consideration of narratives that unfold over a series of novels, there are a number of such series – associated to a greater or lesser extent with science fiction – that could be productively analysed through the critical framework developed here. These include the larger cycle of novels of which *Oryx and Crake* is a part (*The Year of the Flood* (2009) and *MaddAddam* (2013)), Kim Stanley Robinson's 'Science in the Capital' trilogy (*Forty Signs of Rain* (2004), *Fifty Degrees Below* (2005), *Sixty Days and Counting* (2007)), and Stephen Baxter's 'Northland' trilogy (*Stone Spring* (2010), *Bronze Summer* (2012) and *Iron Winter* (2013)). Again, whilst the concerns and literary techniques of these novels overlap with those analysed here, their sustained narratives and more particular depictions of science and technology also suggest further ways of helping readers to think through and beyond the new ways of thinking that are demanded by the Anthropocene. Baxter's Northland trilogy for example speculates upon human attempts to intervene in an historical experience of climate change that draws attention to ancient interactions of human technology and environment over an extended historical narrative.

In thinking about the Anthropocene however, and in thinking in particular about how such thinking is itself structured by the anthropocentric ideas that I have suggested underpin ideology under industrial modernity, a further question comes into particular focus; the contrast between how anthropogenic climate change is perpetuated and experienced in the core of global capital and at the periphery. Indeed, the question of 'from where' the writing analysed here proceeds is, perhaps, even more urgent than the question of 'who' the authors are. This is not to dismiss the relevance of nationality, ethnicity, gender or sexuality in how fiction might approach anthropogenic climate change. But within the specific foci of this thesis – most especially the concern for how the anthropocentric foundations of ideology discourage the subjects of industrial modernity to think in the ways that the Anthropocene highlights are necessary – the differing global experiences of such modernity are brought into particularly urgent relief around the differences between the centre of the global economy and its periphery.

A particularly rewarding area of future research would therefore be to approach the unanswered question that proceeds most acutely from the scope of this thesis; how are the anthropocentric foundations of ideology that obscure the ways of thinking demanded by the

Anthropocene revealed and disrupted in texts written from outside the core of global capital? As discussed in the Introduction, critical work on different global experiences of anthropogenic climate change is current and on-going. But it has also become clear in the analysis of the texts considered here that there are particular ways in which anthropocentric thinking serves to perpetuate the experience of industrial modernity that is exemplified by characters such as *Solar*'s Professor Beard and *Galapagos*' Andrew MacIntosh. The specificity of this experience opens up the question of how the critical framework I have developed in this thesis might be further developed to productively analyse texts that offer markedly different perspectives to those represented by such characters. How, for example, are the strategies by which individuals are encouraged to participate in the anthropocentric exploitation of the biosphere disrupted in particular ways by texts such as Helon Habila's *Oil On Water* (2010), which draws specific attention to the unequal unfolding of such exploitation? What light can be shed upon dominant understandings of anthropogenic climate change by texts that attend to the complex entwining of non-European or non-North American human histories and geologic history? If the Anglo-centric perspective of Professor Beard on such dual histories calls attention to a potentially damaging mis-appropriation of the Anthropocene, how might such differentiated perspectives address this? Such questions highlight the need for an on-going process of developing the critical ideas developed in this thesis. Indeed, inasmuch as this thesis has sought to answer specific questions about how the literary fictions of science and apocalypse that it analyses help readers to think differently about their individual and collective relationship with the biosphere, it has also aimed to contribute a particular critical framework to the urgent and emerging field of literary climate change criticism. But this contribution marks one part of a beginning within a broader, urgent, and still relatively new area of research.

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[1] This 'view' could be likened to that of the 'Angel of History' in Walter Benjamin's interpretation of Paul Klee's *Angleus Novus*, in which the angel looks back towards history as a 'single catastrophe' rather than as a 'chain of events'. Robert Lehman has argued that this allegorical view of history emphasises the fallacy of traditional historicist renderings of history and progress. See Robert S. Lehman, 'Allegories of Rending: Killing Time with Walter Benjamin', *New Literary History*, 39 (2008), 233-250 <http://dx.doi.org/10.1353/nlh.0.0021>.

[2] As noted in Chapter 4, the importance of the ideas with which ideas are thought is highlighted by Donna Haraway, who is citing Marilyn Strathern.

[3] Donna Haraway, *Anthropocene, Capitalocene, Chthulucene: Staying with the Trouble*, online video recording, Vimeo, 8 June 2014, <https://vimeo.com/97663518> [accessed 4 March 2015].

[4] Haraway, *Anthropocene, Capitalocene, Chthulucene*.

[5] Marilyn Strathern, *Reproducing the Future: Essays on Anthropology, Kinship and the New Reproductive Technologies* (Manchester: Manchester University Press, 1992), p. 10.

[6] J. G. Ballard, *The Drowned World* (London: Harper Perennial, 2006), p. 175.
[7] Cormac McCarthy, *The Road* (London: Picador, 2006), p. 93.
[8] Isabelle Stengers, Heather Davis and Etienne Turpin, 'Matters of Cosmopolitics: on the Provocations of Gaïa', in *Architecture in the Anthropocene: Encounters Among Design, Deep Time, Science and Philosophy*, ed. by Etienne Turpin (Ann Arbor, MI: Open Humanities Press, 2013) <http://dx.doi.org/10.3998/ohp.12527215.0001.001>.
[9] Adam Trexler, *Anthropocene Fictions: The Novel in a Time of Climate Change* (Charlottesville, VA: University of Virginia Press, 2015), location 545 of 5678. Kindle ebook.

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