The Brave New Worlds of Green Science Fiction: Ecocritical Discourse in *The Three-Body Problem* and *The Long Earth* Series

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A Thesis Submitted in Partial Fulfilment of the Requirements of Liverpool John Moores University for the Degree of Doctor of Philosophy

March 2023

Contents

Abstract

This thesis examines two twenty-first century eco-science fiction series, *The Three Body Problem* series (2006-2010), by the Chinese science fiction author Liu Cixin, and *The Long Earth* series (2012-2016), co-authored by Terry Pratchett and Stephen Baxter. It first traces the metamorphosis of science fiction from a genre primarily concerned with human adventure and heroism, to a more eco-conscious narrative mode in which humankind is instead delineated as a destructive force set on a path of environmental despoilation, and how this 'New Wave' of science fiction occurred at the same moment as the launch of the modern environmental movement in the 1960s. Each of the chapters addresses the ways in which both of these series treat a number of environmental concerns, such as the problematic manner in which we speak about the more-than-human world; the rapid deforestation of our planet; the shared violence experienced by women and our animal kin; the delineation of the forest in literature and popular culture as either malevolent, benevolent, or imperilled; the potential environmental fallout from nanoscientific developments; what could happen to our planet if we were to communicate with extraterrestrial life; and the use of video-ludic recreation as a vehicle with which to communicate eco-anxieties and to simulate worst-case-scenario environmental futures. The thesis argues that eco-science fiction is a crucial cultural contribution to ecocritical discourse, and one that has a considerable influence on the environmental consciousness of its readership. In its examination of a broad spectrum of issues that we face, not just in the immediate present but in the near or distant future, this thesis underlines that eco-science fiction is an essential cultural instrument with which to understand and respond to our planet in an epoch of environmental crises.

Declaration

No portion of the work referred to in this thesis has been submitted in support of an application for another degree or qualification of this or any other university or other institute of learning.

Acknowledgements

I would first like to thank Professor Joe Moran, who has supported me immensely throughout my research with patience, kindness, and invaluable direction.

My gratitude also extends to Dr Bella Adams, who greatly influenced the course of this thesis and my research with her insight, and to Dr Fiona Tolan, who joined my supervisory team in its final year in order to help see it through to completion.

Thanks also to Dr Michael Perfect, who became the third member of the team near the end of this project, and provided helpful feedback on the final draft of this thesis.

I also gratefully acknowledge Professor Robin Leatherbarrow and the wider Liverpool John Moores University community for all of their support, and for the award of the full LJMU research scholarship that enabled me to undertake this research project.

Thank you also to my family, whose love and support have spurred me on throughout the course of crafting this thesis.

Last, but by no means least, I am indebted to Andreas, whose help and encouragement have never once wavered, and without whom this would have been my Everest.

This thesis is dedicated to the memory of Dr Jo Croft, who forever had faith in me, who mentored me from when I was an undergraduate, and who set me on the path of my PhD, but sadly was not able to see its completion. Words cannot express the joy she brought to our lives and the role she played in shaping my future. May she rest in peace.

Introduction

0.1: How Great Art Humankind: The Recurrent Trope of Heroism and Adventure in Past Science Fiction

The epoch of traditional science fiction literature was a period replete with stories that instilled a sense of wonder in their readership. If we contemplate the birth of science fiction, we tend to recall a canonical list of scientific romance narratives preoccupied with fantastical adventures or *voyages extraordinaires* to exotic loci. These stories invited us to travel into near space, in lunar exploration tales such as Jules Verne's *From the Earth to the Moon* (1865), in which three intrepid travellers are shot into space inside a hollow bullet launched from a colossal cannon, or H. G. Wells's *The First Men in the Moon* (1901), which sees a scientist invent an incredible anti-gravity substance which enables him to undertake an expedition to the lunar landscape—a terrain whose outer rind masks a subterranean world populated with an insectile extraterrestrial civilisation. In addition to alien worlds without, in the velvet darkness of space, this initial period of science fiction was also concerned with inner (terrestrial) spaces, in which adventurers would descend into the interior of the planet and find habitable worlds populated with curious landscapes and creatures, before their eventual return to the surface in order to resume routine life once more. This concept of the hollow earth narrative is best illustrated in works such as *Niels Klim's Underground Travels* (1741), by Ludvig Holberg, in which our explorer falls down a chasm in a mountain and arrives at a subterraneous planet which is home to a civilisation of tree-folk, or Jules Verne's *Journey to the Centre of the Earth* (1864), which delineates an expedition down into an extinct volcanic crater and into a world beneath the terrestrial crust stocked with primeval animals and immense forests. The final principal motif found in this first era of science fiction literature was stories of worlds lost in time, such as *The Lost World* (1912), by Arthur

Conan Doyle, which tells of a hitherto untraversed Amazonian plateau in which dinosaurs and other prehistoric lifeforms still inhabit the Earth.

This brief snapshot of what science fiction once was indicates that it was first and foremost a literature preoccupied with the triumph of earth-born men in the pursuit of the unknown. The fantastical scenarios delineated in this earlier period tended to link adventure and colonial conquest, and were stamped with a succession of human heroes—neo-Columbuses who dominated extraterrestrial worlds, netherworlds, and lost worlds, and then returned to the civilisation of man with a veritable treasure trove of precious minerals or exotic specimens with which to corroborate their marvellous exploits and make their wealth. This initial period of science fiction did not appear to concern itself with environmentalism or the impact of humankind on the planet(s), and can instead be epitomised as one massive marvel at what humankind could accomplish with a scientific mind and a compass. While spirited adventures to alternate worlds crowded this earlier epoch of science fiction, it was not, however, wholly devoid of an environmental consciousness. There is a popular consensus that the birth of eco-science fiction coincided with the inception of the modern environmental movement and the publication of *Silent Spring* (1962). While it is true that this is when we started to see an influx of eco-science fiction in the market, it is important to note a number of stories that treated environmental anxieties were published in the pulp magazines prior to this environmental turn. This tells us that 'in the world of science fiction at least some awareness was made about the environment long before the rest of the world sat up and took notice' (Ashley, 2020, 9).

Nature's Warnings: Classic Stories of Eco-Science Fiction (2020), is a collection of eleven science fiction stories published between 1903 and 1963, that predate the modern environmental movement and break the mould of the brash human hero on a quest to traverse

and appropriate new frontiers. The book presents a slideshow of the eco-catastrophic follies of humankind. For instance, in John Beresford's 'The Man Who Hated Flies' (1929), a scientific endeavour to annihilate house-flies ends with the death of ten thousand species of insect, and so a less vibrant and sonorous world afflicted with crop failures and the demise of flowers and birds. This narrative, in which the balance of nature is upset due to an unwarranted intervention, finds its parallel in 'Shadow of Wings' (1954), by Elizabeth Holding, in which an extraterrestrial civilisation that intends to cause the downfall of humankind and then relocate to this world subsequent to its demise, lures all of the birds away from their usual food sources. The insect population is therefore free to wreak havoc on crops, pasture lands, and timber forests, while certain species of fish that constitute the routine diets of seabirds, start to crowd out their freshwater and marine counterparts. There is also no recompense to be found in manufactured insecticides as a solution to the insect problem, for in an anticipation of what Rachel Carson would soon draw attention to in *Silent Spring*, these are found to have caused irreversible harm both to humankind and to flora and fauna that have come into contact with their toxic mists. The final example I want to illuminate in this collection is Nathan Schachner's 'The Sterile Planet' (1937). This is an environmental (in)justice narrative in which the Earth has become an arid wasteland due to the march of human civilisation, and is divided into two factions—a small portion of the population who reside in protective domed oases with ample food and water, and the bulk of humankind forced to eke out their survival in the deserts and fetid swamps of the ocean beds that comprise the remainder of this devastated landscape.

0.2: The Environmental Turn of the New Wave: Science Fiction Goes Green

It was not until the birth of the New Wave science fiction movement in the 1960s, associated with writers such as Brian Aldiss and Ursula K. Le Guin, that we started to see a more substantial transition from scientific and colonial romances that celebrated human adventure and heroism, to a more eco-conscious science fiction in which humankind was instead delineated as a destructive force set on a path of environmental despoilation. This metamorphosis did not, however, mean that science fiction abandoned its tool-box of traditional motifs in all respects. While science fiction published since the advent of the New Wave movement saw a significant shift from 'the kind of science fiction that was once most iconic, stories of space travel and interplanetary colonisation', those quintessential elements of classic science fiction such as rocketships and expeditions to extraterrestrial worlds did—and do—still 'remain a part of the science fiction imaginary' (Vint, 2021, 158, 163). However, as Sherryl Vint writes, 'they no longer define the genre as they once did', and nor are these elements used in the same manner when one does make an appearance (2021, 163). The rocketships and elsewhere worlds of earlier science fiction started to arise, more often than not, in this new era not as props with which to support the hedonistic exceptionalism of humankind, but instead as vehicles for the dissemination of real-world issues such as those at the forefront of environmentalism, and to critique, rather than celebrate, human action. For instance, the alien planet of Trisolaris encountered in Liu Cixin's Chinese science fiction novel *The Three Body Problem* (2006), is not described as a place for humankind to travel to and conquer as in most prior science fiction, but as a parable used to comment on the scale and rate of the real-world climate crisis. The New Wave of eco-science fiction thus offered its readers something that earlier science fiction narratives lacked—traditional bread and butter science fiction motifs such as novel inventions and extraterrestrial contact, intertwined with

real world environmental concerns; a science fiction that was not just fantastical, but pertinent to the world of now.

This need for a radical departure from stories of human exceptionalism and technophilic adventure in favour of a new direction was underscored by authors such as J. G. Ballard, whose influential editorial, 'Which Way to Inner Space?' published in a 1962 edition of the pulp magazine *New Worlds*, is 'widely seen as the first clear statement of the aesthetic agenda of the 1960s New Wave' (Latham, 2018, 97). This article was a polemic on what Ballard characterised as the outdated and puerile conventions of old-school science fiction such as 'rocket and planet' stories, and also presented a vision of a new mode of science fiction (1962, 3). This was to be a literature replete with novel scenarios and complex as opposed to formulaic ideas (such as the standard plot of the intrepid adventurer who sets forth for a new world to conquer and plunder prior to his return, with much fanfare, as a hero), a literature less concerned with fantastical speculation and more in tune with 'the realism of our time' (Flood, 2009). In his attack on the old gauntlet of science fiction, Ballard wrote of the need for the genre to 'turn its back on space, on interstellar travel, extraterrestrial lifeforms, galactic wars, and the overlap of these ideas that spreads across the margins of nine-tenths of magazine science fiction' (1962, 117). This, Ballard argued, is because 'the biggest developments of the immediate future will take place, not on the moon or Mars, but on Earth, and it is *inner* space, not outer, that needs to be explored' (1962, 117). Ballard pointed out that 'the only true alien planet is Earth', for in a genre in which worlds in space or below the surface of the Earth saturated the market, the Earth itself was the last brave new world to be traversed (1962, 117).

Ballard was one of the earliest authors to be subsumed under the New Wave science fiction label. If we look to his oeuvre, the first three of his novels all address various

scenarios of environmental destruction on Earth—ecological catastrophes that we would now attribute to the climate crisis. Jim Clarke points out that 'Ballard wrote these novels in the early 1960s, long before climate change became a prominent subject in the popular press, and even before the term "global warming" was coined by environmental scientist Wallace Broeker in 1975' (2013, 9). In his first publication, *The Wind from Nowhere* (1961), incessant hurricane-force winds have reduced human civilisation to rubble across the planet. Its follow-up novel, *The Drowned World* (1962), sketches a picture of a diluvian world in which fluctuations in solar radiation have melted the polar ice caps and rendered much of the surface of the planet uninhabitable. In *The Burning World* (1964), industrial waste has thickened the mantle of the oceans and wrecked the precipitation cycle, so that the planet is reduced to a wilderness of ice and fire. These proto-climate fiction stories do not, however, attribute blame for these environmental catastrophes to humankind. Instead, Ballard delineates the climate crisis 'as something that happens *to* humanity rather than something that is committed or generated *by* humankind' (Clarke, 2013, 10). This is at odds with later eco-science fiction, which has no qualms about underscoring its anthropogenic genesis. In spite of this facet, Ballard has been identified as 'sci-fi seer'—a prophet of a future that has been clouded with environmental crises, and one in which science fiction has become science fact (Clarke, 2013, 20). As Dan O'Hara writes, 'it often seemed that Ballard was living five minutes into everyone else's future' and 'it has also often seemed that his unconscious was somehow script-writing that same future' (2012).

If we fast-forward to the new millennium, there has been a sharp increase in eco-science fiction that speaks to the central environmental concern of the present epoch—the climate crisis and its concomitant effects on our planet. While 'in the 2000s, environmental critique has become a crucial component of work in the humanities generally, becoming a part of the social justice mission alongside race, gender, class, and sexuality', Gerry Canavan

argues that ‘this is especially true of science fiction studies, where the idea of the future that is so central to science fiction now seems overdetermined by environmental crises’ (2017, 218). The phantasm of ecological emergency ‘hangs over the genre now in the way that, at an earlier moment, the spectre of nuclear war did—the centre of gravity for many lines of speculation’ (Canavan, 2017, 218). One of the most prominent contemporary writers of eco-science fiction who deserves discussion is Kim Stanley Robinson, an author whom Adam Trexler and Adeline Johns-Putra maintain ‘has emerged as science fiction’s most important writer to deal explicitly with the problem of climate change, not simply as the premise for an other-worldly setting but as a social, cultural, and political phenomenon and problem, requiring unusual methods of characterisation and plot’ (2011, 187).

The Ministry of the Future (2020), to take one example from his oeuvre, is a near-future cli-fi narrative in which eco-disasters across the world are the new normal. The novel commences with an extreme heatwave in India, in which the environment becomes a hellscape of bodies and brush fires, and similar scenes are in bloom across the planet. In America, we learn that ‘droughts were coming more and more frequently’, complimented with ‘occasional deluges’, so that ‘either too little or too much was the new pattern, alternating without warning’, while in other parts of the world ‘the sea ice is melting and the permafrost is thawing’, ocean temperatures and acidification are on the rise, and extinctions are occurring *en masse* (Robinson, 2020, 184, 33). The inadequate action taken in order to fix this world about to collapse prompts citizens to take matters into their own hands, and to seek out and punish those deemed climate criminals in a battle for the fate of the planet, before the world is one massive irreversible and unfixable catastrophe. This leads to radical measures to decarbonise civilisation, lower temperatures, and conserve and rewild the land in order to save the world. The introduction of ‘carbon coins’, for instance, incentivises countries to keep their carbon stores sequestered beneath the earth, with ‘one coin per ton of carbon captured’,

while the ‘Half Earth’ project is established in order to repurpose half of the planet as wild land left untouched for flora and fauna (Robinson, 2020, 401, 477). There is also a succession of fruitful, but fanciful, geo-engineering projects used to pull the planet back from the brink of wholesale ecocide, such as one in which meltwater is pumped back up onto the Antarctic polar plateau to re-freeze and thus cause a slowdown of the massive glacial thaw (see Robinson, 2020, 471). Therefore, while the novel commences with a despondent red-alert for the planet, it ends with a beacon of hope that we can nurse the environment back to health and make a better world.

0.3: Science Fiction and Transformative Environmentalism

Despite the focus of the New Wave on ecological concerns, the position of science fiction as a literature of transformative environmentalism has been questioned over time. In his book *The Great Derangement: Climate Change and the Unthinkable* (2016), Amitav Ghosh excludes science fiction from serious consideration as a contributor to ecocritical discourse and environmental activism when he writes that ‘the anthropocene resists science fiction’, because it focuses on ‘an imagined “other” world apart from ours’ (2016, 72). However, Ghosh does allow that science fiction at least addresses the climate crisis. This is an inclination not often encountered in mainstream literature, (but two notable examples are the novel *Solar* (2010), by Ian McEwan, and the *MaddAddam* series (2003-2013), by Margaret Atwood). For Ghosh, the reason for this oversight is because climate scenarios are ‘peculiarly resistant to the customary frames that literature has applied to “Nature”: they are too powerful, too grotesque, too dangerous, and too accusatory to be written about in a lyrical, or elegiac, or romantic vein’ (2016, 32-33). To introduce these scenarios into a novel ‘is in fact to court eviction from the mansion in which serious fiction has long been in residence; it is to

risk banishment to the humbler dwellings that surround the manor house', what Ghosh terms the 'generic outhouses' such as science fiction (2016, 24).

The sub-genre of eco-science fiction concerned with the climate, referred to as 'cli-fi', a term coined in 2007 by journalist Dan Bloom (See Glass, 2013), leads Ghosh to express further discontent with science fiction and its inaptitude to confront this epoch of environmental turbulence. This is because Ghosh writes that cli-fi is mostly comprised of 'disaster stories set in the future', which is just 'one aspect' of an anthropocene that 'also includes the recent past, and, most significantly, the present' (2016, 72). What Ghosh fails to take into consideration, however, is that the time-frame in a science fiction narrative is unimportant. What matters is the nature of the narrative encounter, and whether or not it compels the reader to think about environmental issues in the here and now. Whether a book is set in the near or distant future does not detract from the fact that eco-science fiction as a cultural form helps us to conceptualize and respond to a world that it has started to resemble.

This attack on the reputation of science fiction as a literature of no social scope first appeared in earlier critiques such as that of the science fiction author and critic C. M. Kornbluth. In *The Science Fiction Novel: Imagination and Social Criticism* (1969), a collection of four essays written by science fiction authors and critics, Kornbluth wrote of the failure of the science fiction novel as social criticism, due to his belief that 'in science fiction the symbolism lies too deep for action to result' and that, subsequently, 'the science fiction story does not turn the reader outward to action but inward to contemplation' (55). David Seed writes that, for Kornbluth, '"effective" appears to mean directly altering social behaviour—a fantasy of literature's impact with a vengeance!' (2011, 127). While the role of literature in transformative environmentalism can appear infinitesimal in this epoch of extensive environmental upheaval, this thesis seeks to counter and subvert this conception of

an ineffective science fiction, and instead strives to underline that 'discussing damage is not an insignificant act; discourse on damaged environments is vital in increasing awareness of compromised spaces' (Thornber, 2012, 296). Both Ghosh and Kornbluth dismiss science fiction—the former because of the concern that it is too preoccupied with the future to impact the eco-consciousness of its readership (the view that science fiction is too boundless), and the latter because of the belief that it buries its ideas too far down where one cannot find and make sense of them (the idea that science fiction is too complex). Juxtaposed with these two critics, however, are advocates of what science fiction can do, such as Stephen Dougherty, who observes that 'although the cosmic perspective advanced by science fiction might possess a grandiosity, it also helps us to see how fragile are both the Earth and the human species. This fragility and vulnerability underscore a sense of collective belonging, both among human beings and to the Earth' (2019, 46). This emphasises that New Wave eco-science fiction is a potent tool with which one can better understand and respond to the more-than-human world.

The power that literature wields and the influence that it has on the eco-consciousness of humankind should not be underestimated, in particular since we know that 'the human mind is built to think in terms of narratives, of sequences of events with an internal logic and dynamic that appear as a unified whole' (Akerlof and Shiller, 2010, 51). This idea that our brains work to metamorphose information into stories, so that we end up with a kind of filled cerebral bookcase, supports the argument Karen Thornber proposes in her book *Ecoambiguity: Environmental Crises and East Asian Literatures* (2012). This is her ardent belief that narratives do not just tend to 'surpass data in their power to change people's behaviour', but that in order 'to become comprehensible, let alone to effect change, data themselves must be translated into narrative, and ultimately stories', because 'stories have the capacity to awaken, reinforce, and redirect environmental concern and creative thinking

about environmental futures' (Thornber, 2012, 5). What is more, writes Thornber, the domain of fiction can 'move us profoundly, as it exposes how people dominate, damage, and destroy one another and the natural world. It also allows us to imagine alternative scenarios' (2012, 5).

It is evident that literature, with an emphasis on eco-science fiction, can do what empirical data alone cannot, which is to enable its readership to better conceptualise otherwise difficult to grasp and often abstract ideas such as the climate crisis. This scenario is immense in scale, both in terms of space, because it is worldwide, and time, because it is more often than not what Rob Nixon defines as a 'slow violence', which he explains is 'a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space' (2011, 2). In the creation of tales of eco-catastrophe set in worlds we can perceive as our own, it is thus possible to reduce the cognitive distance between the readership and environmental disaster. In contrast to the publication of cold, bland, quantitative data, eco-science fiction narratives communicate to their readers immersive and plausible delineations of the planet that inspire affective responses and activism towards present eco-crises and environmental futures. These tales thus herald a shift from merely number crunching environmental fatalities, and instead propound fresh modes of visualising not only realised problems, but also a consideration of how the world could be otherwise in the future—for as Ghosh writes, 'the great, irreplaceable potentiality of fiction is that it makes possible the imagining of possibilities' (2016, 128). However, unlike Ghosh, this thesis demonstrates that science fiction is very much part of this process.

0.4: Thesis Rationale and Structure

The intention of this sub-section is to provide an overview of the two series examined across this thesis, and to outline the chapter structure that will follow this introduction. *The Long*

Earth series is comprised of five books first published between 2012 and 2016. This series is co-authored by Terry Pratchett, a fantasy and science fiction author best known for his 41 Discworld novels, and Stephen Baxter, a hard science fiction writer, (a kind of science fiction whose main concern is scientific realism), whose oeuvre includes works such as the *Xeelee* sequence—a series of nine space opera novels and three volumes of novellas and short stories that spans eons. In *The Long Earth* series, the world is transformed when a scientist uploads a blueprint to the internet with which to build his invention called a 'Stepper box'. This is a simple potato-powered device crafted from routine odds and ends that permits humans to flick a switch and step from this world into an endless chain of Earth upon Earth, each one like the original, more or less, but with one crucial exception. These stepwise worlds are not home to humans, who evolved on one planet alone, but are instead replete with an eclectic mix of novel and (or) once extinct flora and fauna such as mammoths and dinosaurs, in addition to various species of humanoid such as the amicable, ape-esque trolls, and the less-than-amicable elves, who hunt and kill those who cross their path and farm a sub-species of elf known as lollipops (due to the sizeable nature of their heads) for food.

When humankind sets out in order to explore and expand into these new worlds, the idea that this will herald a second chance and an escape from the woes of the current world appears to be far-fetched. This is because, most of the self-same environmental crises that plagued the original Earth, which is called the 'Datum Earth' in the series, reassert themselves in spite of this new boundless space and concomitant chance for improvement. The biota of these natural worlds remains the subject of human indifference, (that is, outside of the realm of profit), as evidenced when we continue to witness vast swathes of forest processed into timber, and other flora extracted from one planet in order to be commoditised on another, either in the food or medicine industries. The exploitation of animals also persists in this chain of parallel worlds, as becomes clear when animals continue to be farmed for

wool or killed for food, and the helpful and benevolent entities known as trolls are used in scientific experimentation and forced labour, butchered for folk medicine, or are hunted for blood sport like their other native animal kin. What is more, humankind also ruins at least one of these stepwise worlds due to a lack of caution in the face of a new techno-scientific invention. This takes the form of a matter replicator, a nanotech machine that runs amok and converts the plant biomass of an entire world into more iterations of itself. In short, these are unfamiliar worlds with (alas) all too familiar patterns of behaviour on the part of humankind.

I want to look at *The Long Earth* series as part of this thesis because it has not received much academic attention. While there has been some scholarship on environmental issues in the acclaimed Pratchett Discworld series, (see for instance de Villiers, 2014, Zulfa, 2020, and Dědinová, 2022), the same cannot be said, however, for his non-Discworld novels. This was also why I chose to examine some of those works, namely, *The Carpet People* (1971), and *The Bromeliad* series (1989-1990), as part of my MRes thesis in 2017. When it came to research on *The Long Earth* series, I encountered just one book chapter in *Environments in Science Fiction: Essays on Alternate Spaces* (2014), by Lauren J. Lacey. This discusses, in brief, the first book in the series, and at most scratches the surface of its ecocritical content when Lacey writes of an incident in the novel (in which a scientific expedition cut down a tree on one of the stepwise worlds in order to look for climate records in the tree ring patterns), that she writes 'is just one of the signals that humanity is in danger of making the same thoughtless mistakes it has made on Datum Earth on all of the new worlds' (2014, 25). I felt that this series did not deserve to be buried like the rest of the non-Discworld Pratchett oeuvre, but rather to be celebrated for all that it communicates to us about our problematic relationship with the rest of the natural world (or in this case, worlds). What is more, I found *The Long Earth* series addressed a lot of the same themes as the

second series I chose to write about here, which made for manifold points of ecocritical comparison.

Although *The Long Earth* series has not had as much of a worldwide reach compared to the second series I examine in this thesis, it has still received a commendable number of translated editions and reached a plethora of new audiences around the globe. The first book in the series, which was published in the United Kingdom in 2012, has since been translated into Czech, Estonian, Finnish, French, German, and Polish in 2013; Russian, Spanish, and Turkish in 2014; Hungarian in 2015; Romanian in 2016; Bulgarian and Italian in 2017; and Brazilian Portuguese in 2018. Although it has not received the multitude of nominations and awards garnered by other series in the world of science fiction, book one of *The Long Earth* series did win the Goodreads Choice Awards 2012 for science fiction and also reached number 13 on the *New York Times* hardcover fiction bestsellers list on the 8th of July 2012.

The second series that I wish to examine as part of this research project is *The Three-Body Problem* trilogy, which is also known as the *Remembrance of Earth's Past* series, by the Chinese science fiction author Liu Cixin. The first book, *The Three-Body Problem*, was originally serialised in the monthly Chinese science fiction magazine *Science Fiction World* in 2006, published as a novel in 2008, and translated into English in 2014. The latter two instalments, *The Dark Forest*, and *Death's End,* followed as published novels in 2008 and 2010, and were translated into English in 2015 and 2016 respectively. *The Three-Body Problem* series commences with the violence and bloodshed of the Cultural Revolution (1966-1976), in which the protagonist, Ye Wenjie, witnesses the brutal murder of her father by the Red Guards. Two years later, she then experiences the environmental devastation of the Greater Khingan Mountains, in which vast arboreal seas are torn down by the Production and Construction Corps, and the landscape metamorphosed into a wasteland. These repeated

scenes of human indifference to the death of their kin, whether human, flora or fauna that occur throughout this first book, lead Ye to turn her back on humankind—a rejection that has dire consequences for humankind, the planet, and beyond.

Ye Wenjie leaves her work assignment at the Production and Construction Corps for another occupation at Red Coast Base. This place is home to a powerful radio telescope and a secret quest to search for and communicate with extraterrestrial life. The true nature of the work undertaken here prompts Ye to seize the chance to broadcast a plea to the cosmos in the hope that a superior power will respond, and rescue the planet from further destruction at the hands of humankind. While the mission to locate life elsewhere in the cosmos is successful, first contact with an extraterrestrial civilisation does not, (alas), lead to a wondrous celestial saviour, but to a future invasion. The world that receives her communication, the planet of Trisolaris, is located in Alpha Centauri, the closest extra-solar stellar system. This is a world on the brink of total collapse, due to the unpredictable nature of its three suns. This trio of suns cause extremes of climate, and will soon consume the world of Trisolaris in the same manner as the other eleven planets that once comprised its star system. When the Trisolarans learn of proximity of Earth, (four light-years away), with its one sun and mild climate, it is perceived as a veritable paradise for this doomed civilisation. Therefore, a thousand ship interstellar fleet is sent forth to quash humankind and take the planet over, but it will not arrive for another five hundred years. We learn about this alternate world in the first instalment of the series through a virtual reality video-game called *Three Body*, which was created to help develop sympathy for the plight of the Trisolarans. However, this is a sentiment that devolves into despair (or misanthropic celebration) when humankind comes to learn the true intention of their saviour from the stars, and their consideration of the human species as no more than inconsequential insects.

In *The Dark Forest* (2008), the protagonist, Luo Ji, must thwart the future invasion with the threat of the mutual destruction of Earth and Trisolaris. Luo is an astronomer, who is appointed as one of four 'Wallfacers'. The 'Wallfacer Project' is a last-ditch attempt to defend the planet from an extraterrestrial takeover with clandestine schemes concealed via deceit and misdirection from human and alien minds alike. While the plans to stop the invasion that the first three Wallfacers conceptualise are unsuccessful, Luo Ji is able to come up with a viable proposal that could halt such a catastrophe. Prior to her death, Ye Wenjie explained to Luo Ji her invention of the field of cosmic sociology. This is an unexplored area of research that centres on the notion that the cosmos is not a vast desert devoid of all but a few crumbs of life, but is instead populated with a plethora of alien civilisations, who, unlike humankind, know better than to shout about their existence to the rest of the universe. In this dark forest of a universe, survival is the principal need of civilisation, and so a civilisation that reveals its location will invite their destruction from another world shrouded in the velvet darkness of outer space. We learn that this is because of what is referred to as the 'chain of suspicion'. No one can know whether the inhabitants of another world harbour benevolent or malevolent intentions, and thus one must valorise decisive action over a bout of consideration. It is better to be safe than sorry, and elimination is the safest option. This dark truth about the cosmos leads Luo to formulate a plan. This is a so-called 'spell' that will doom all in its revelation of the precise interstellar coordinates of both Trisolaris and Earth if the fleet do not heed his demand not to cross the Oort Cloud and to set a course for elsewhere in outer space.

In the final instalment of the series, *Death's End* (2010), we discover that while the creation of the dark forest deterrence does work for a time, from 2208-2270, the Trisolar crisis is far from over. This epoch of peace has made humankind complacent, and in the end, deterrence fails. When Luo Ji retires from his post as Wallfacer in 2270 and relinquishes his

power to activate the dark forest deterrence spell (a gravitational wave broadcast), this is when the hour of doom for both worlds chimes. Trisolaris seizes its chance, and immediately launches a strike on the three gravitational wave broadcasting stations dotted across the Earth. The missiles used are known as droplets, alien artefacts hidden in space in order to avoid detection from humans after the order to make an about turn on their plan to invade the Earth. In the post-deterrence epoch that ensues, the Trisolarans decide not to erase humankind, but to enforce a 'Great Resettlement', in which humans are permitted to live in reservations in Australia and on Mars.

This period of apparent extraterrestrial triumph is short-lived, however, for there is a fourth gravitational wave transmitter in outer space aboard the human spaceship, *Gravity*, that survives the coordinated attack that annihilated its counterparts. Those onboard deduce that, due to the attempted strike on their ship, a similar attack must have occurred on Earth, and that their home world must now be under extraterrestrial occupation. Therefore, the crew opt to initiate the universal broadcast that will invite the destruction of both Earth and Trisolaris. This leads the Trisolarans to double back on their conquest of Earth once more, and humans are able to return to their homes to live out the remainder of their days in (relative) peace. It does not take much time for the dark forest nature of the cosmos to reveal itself. Trisolaris is the first planet to be annihilated, in 2275, with a stellar explosion. While the human population establish space cities behind Jupiter, Saturn, Uranus, and Neptune in an effort to survive such an attack on Earth, this proves to be a fruitless endeavour. In 2400, another extraterrestrial civilisation concealed within the dark forest sends forth a projectile called a 'dual-vector foil'. This is an object that resembles a blank piece of paper, but which wipes out the Earth and the rest of the solar system by folding it into two-dimensions, so that the sun, planets, and their contents are all painted into one monumental picture of death. In the cosmic

arena of *The Three-Body Problem* series, humans learn all too late to cherish their world, and that silence in the face of this cruel universe is crucial to survival.

While Liu Cixin is considered to be a prominent author of hard science fiction, academic scholarship published thus far on his oeuvre has tended to focus on his other novels such as *China 2185* (a political cyberpunk novel published in 1989), or on his novellas such as *Micro Era* (1999), and his short stories, the first collection of which, *The Wandering Earth*, was published in China in 2013. The research undertaken on his most famous work, *The Three-Body Problem* series, has revolved around issues such as its treatment of a sublime and amoral cosmos full of extraterrestrial life, or on the spectre of Mao in the novels (see for instance Song, 2018). There was a dearth of scholarship, however, that examined this acclaimed series from an ecocritical perspective, which was what compelled me to pursue what these novels could tell us about the state and fate of our planet in this epoch of environmental turmoil. It is only in the last year that I have begun to notice a trickle of research that has moved to address the relationship between this series and its environmental content (see for instance Erney, 2021, Huang, 2021, and Dories, 2022). Therefore, I believe this thesis will be a well-timed and sizeable contribution to a research gap that has just started to be confronted in the field of eco-science fiction studies.

The acclaim for and widespread reach of the *Three-Body Problem* series has expanded even more since the serialisation of the first book in the Chinese science fiction magazine *Science Fiction World* in 2006 and its translation into English in 2014. This growing influence of Liu Cixin and Chinese science fiction is evidenced if we examine the recent wealth of new translations of *The Three-Body Problem*, which include Korean in 2013; Turkish in 2015; French, German, Hungarian, Portuguese, Russian, Spanish, Thai, and Vietnamese in 2016; Greek, Czech, Italian, Polish, Romanian, and Ukrainian in 2017;

Finnish in 2018; Indonesian, Japanese, Mongolian, Norwegian, and Serbian in 2019; and Bulgarian, Dutch, and Lithuanian editions of the first book in the series in 2020. While Liu expressed mild surprise that *The Three-Body Problem* series had flourished outside of China, he also noted that this supported his firm belief that 'sci-fi as a literary vessel is the most global, the most universal [storytelling], with the capability to be understood by all cultures' (Barnett, 2016, n.p.). Liu explains that this is because 'sci-fi novels are concerned with problems faced by all of humanity. Crises in sci-fi mostly threaten humanity as a whole. This is a unique and treasurable trait inherent in the genre—that the human race is perceived as a single entity, undivided' (Barnett, 2016, n.p.). *The Three-Body Problem* and its two sequels have now sold almost 'nine million copies worldwide' and the books have a host of fans that include figures such as Barack Obama, George R. R. Martin, and Mark Zuckerberg (see Alter, 2019, n.p.). The success of the series is further underscored in its collection of awards. These include the Galaxy award (the most esteemed science fiction prize in China) for both *The Three-Body Problem* and *Death's End* in 2006 and 2010 respectively. In 2015, *The Three-Body Problem* also won the Hugo award for best novel, which is considered the 'premier award' in science fiction (Donahoo, 2010, n.p.).

Focusing on novels that comprise two long-running series, *The Long Earth* (2012-2016) and *The Three-Body Problem* (2006-2010), as opposed to stand-alone novels, is significant. This is because, seriality builds an intimate and ongoing relationship between texts and readerships over time which, in this case, adds to the potential of these books to raise awareness of environmental issues. The import of seriality is one that Susan David Bernstein underlines when she writes that 'the serial novel, broken up in time and space with fixed pauses between published instalments, shapes both reading and writing practices' (2018, 866). For instance, Bernstein argues that 'the psychoanalytic concept of transference [the unconscious redirection of sentiments about a particular person onto someone else]

suggests a wholly different way of exploring seriality', and that 'the novel issued in parts, with instalments punctuated by regular pauses, encourages the back-and-forthness of transference and countertransference [the emotional reaction of oneself to the contribution of another], just as these regular gaps and returns also shape our own affective oscillations between fiction and world' (2018, 866). With both *The Long Earth* and *The Three-Body Problem* series, and the repeated disconnection and reconnection that we have with these fictional worlds, readers are more able to transfer emotions and anxieties about the real world and project them onto these fictions. The same can also be said for the reverse, in which the anxieties and emotions surrounding environmental crises, and the way in which they are delineated in fictional worlds, can be transferred and projected into the real world. The end result is a readership that is suddenly much more aware of eco-concerns—and one that is more invested in the effects of such issues.

The Long Earth series (2012-2016) presents its readership with worlds upon worlds that are replete with exotic and intricate biota. We become increasingly invested in these stepwise planets with each book in the collection. When we then leave these fictional parallel planets behind as we wait for the next instalment in the series, this presents us with abundant time and space with which to dwell upon the fact that we have but *one* habitable world to which we should proffer more attention and respect. The end of the first instalment, *The Long Earth* (2012), sees the people of Madison, Wisconsin, able to flee from one form of existential threat (the human-induced environmental shock of an imminent nuclear bomb) into a stepwise world. In a similar vein, at the end of the second instalment in the series, *The Long War* (2013), populations from areas affected due to a catastrophic super-volcanic eruption at Yellowstone, are able to evacuate the initial 'Datum Earth' into parallel worlds in order to avoid both the impact and the subsequent onset of a widespread volcanic winter. However, as readers we are conscious that, should we lead our singular liveable planet to

destruction due to (for example) climate collapse, or should some other terrible non-human induced disaster befall our world, we do not have the option to simply enter a stepwise iteration of the planet and start over. Therefore, it is imperative that we work in earnest to preserve this planet from harm. The pause between each of the instalments in *The Long Earth* series also provides its readership with adequate time to contemplate the fantastical notion of what would happen if we *were* faced with the sudden appearance of infinite worlds filled with complex flora and fauna that humankind could diffuse into. Would this chance for a *tabula rasa* lead us to repeat the errors of the past and cause the exploitation of a greater array of our more-than-human kin and the despoilation of planet after planet, or would we be more considerate in our adventures into these brave new worlds?

The first novel in *The Three-Body Problem* series (2006-2010), introduces readers to the dire prospect of an extraterrestrial invasion of planet Earth, a peril which is the result of a star-powered radio wave broadcast into the cosmos filled with information about our world and human civilisation. In a similar manner to *The Long Earth* series (2012-2016), between instalments this leads us to ruminate on the fact that we have just *one* suitable world on which to live. Therefore, humankind is imprudent to treat it with such reckless abandon in acts that we see throughout the opening novel that include communication with extraterrestrials, inter-human violence, and widespread deforestation and loss of biota caused due to habitat loss and other acts of modern civilisation. Readers are subsequently prompted to think before we act on our world—lest we contribute to its demise. The final instalment in *The Three-Body Problem* series, *Death's End* (2010), reinforces this harsh truth that, if we imperil the Earth due to human action, in this case due to communication with extraterrestrial life, we have no fantastical science fictional terrain in which to start anew. While the characters in *The Long Earth* series have their stepwise worlds, in *Death's End*, humankind is able to establish a 'Bunker World' of space cities millions of kilometres from the Earth behind Jupiter, Saturn,

Uranus, and Neptune with which to attempt to avoid the fallout from the future extraterrestrial invasion and thus preserve civilisation. When we read this last book in the collection, we are reminded that we are (alas) in no such position in the face of an existential threat.

While we do become swept up in the maelstrom of future disaster as we read the first book in *The Three-Body Problem* series, between novels we are also moved to ruminate on the harsh truth that it is much more probable that our world will be devasted due to the climate crisis as opposed to an invasion from outer space. In *The Three-Body Problem*, we learn that the extraterrestrial fleet will reach the Earth in four and a half centuries. As we wait for the next book in the series, this leads us to wonder about the state and fate of our own world in such a time frame. Will our environmental state of affairs be better or worse? What is more, if we knew that the hammer would fall on planet Earth on a particular date and time, as is the case in this novel, would this not cause us to do more in the interim in order to prevent said doom? This first book in the series attempts to end on a note of hope in the face of what is to come. This sense of hope stems from the idea that humans have tried to annihilate insect pests for a significant amount of time and with all manner of chemicals and instruments, and still these creatures persist, much like the characters believe that humankind will when confronted with an alien power. Da Shi elucidates that ‘bugs have not been eliminated. They still proudly live between the heavens and the earth, and their numbers have not diminished from the time before the appearance of the humans’ (Liu, 2016, 422-423).

However, informed readers will finish *The Three-Body Problem* with a sense of just how misplaced this hope is. For when we leave this first book behind, what remains with us is the sad reality of ‘the dreadful state of insect biodiversity in the world, as almost half of the species are rapidly declining and a third are being threatened with extinction’ (Sánchez-Bayo

and Wyckhuys, 2019, 22). Although this series leaves readers with the dire scene of a dead solar system—one that has been metamorphosed into a two-dimensional picture due to an attack from another extraterrestrial civilisation—the end of the final instalment, *Death's End* (2010), seeks to remind us how beautiful, but fragile, our planet is. This is evidenced in the inclusion of the 'ecological sphere' on the final page (Liu, 2017, 721). This 'miniscule world of life' is an earth-object left behind in a mini-universe at the end of the novel, which includes a miniaturised sun, continents, fish, and plant life (Liu, 2017, 721). What remains with us in view of this final image, is the idea of our world as a bubble—a thin sphere of liquid that could burst in an instant if there is not sufficient care taken to keep it afloat. In conclusion, when we examine the significance of seriality and the effect of such prolonged relationships between texts and readers, the above evidence points to higher reader investment and a sustained presence of themes, lore, and social commentary within the minds of readers. The serialised nature of both *The Long Earth* and *The Three-Body Problem* creates readers who are more connected to these fictional worlds, and who are more conscious of the real-world environmental issues addressed in the novels (be they implicit or explicit). These readers are thus more inclined to identify the similarities between the delineation of environmental crises in fictional worlds versus reality, and to take positive action to promote change and tackle issues directly.

This thesis demonstrates that New Wave eco-science fiction is a crucial cultural contribution to ecocritical discourse, and one that has a considerable influence on the environmental consciousness of its readership. It aims to contribute to and build on the field of literary scholarship that includes publications such as *Green Planets: Ecology and Science Fiction* (2014), edited by Gerry Canavan and Kim Stanley Robison, and *Green Speculations: Science Fiction and Transformative Environmentalism* (2012), by Eric C. Otto, both of which examine the relationship between New Wave science fiction and environmental anxieties. As

this introduction has suggested, the previous period of science fiction was, first and foremost, an epoch of scientific and colonial romances that instilled a sense of wonder in their readership, and were concerned with the adventures of humankind in unfamiliar worlds coupled with human heroism. It then looked at the advent of the science fictional New Wave, which coincided with the launch of the modern environmental movement. This showed that what has impacted our planet in the current epoch of the anthropocene has also impacted our literature, as we mapped a pronounced transformation from a science fiction that lauded the fantastical feats of humankind, to a more eco-conscious science fiction in which humankind was instead delineated as a destructive force set on a path of environmental despoilation. This environmental turn in science fiction, a genre that deals in futurisms more often than not, has meant that much of what is published rarely envisions a world not clouded over with environmental ruination. As is evident in *The Three-Body Problem* (2006-2010) and *The Long Earth* (2012-2016) series, it seems the once far-fetched loci of science fiction have now become loci of social realism. Worlds apart have become, in essence, worlds closer to home: planets under threat due to the impact of humankind, worlds of climate crisis and other environmental maladies.

The first chapter, 'The Death of the Forest: Bio-Erasure as a Consequence of Plant Blindness and Plantsploitation in *The Three-Body Problem* and *The Long Earth* Series', will examine the problematic manner in which these series use language to conceptualise the plant sphere. It looks at how trees and other flora are delineated either as passive resources to be exploited at will, or as anthropomorphised entities stripped of their own unique qualities. It argues that this reckless abandon with which we speak about the verdurous world results in another often-overlooked form of plant death to that of the axe or weedkiller. This chapter finds that the ways in which both of these series address plant life is indicative of a widespread indifference to the verdurous world, a phenomenon that has become known as

‘plant blindness’. The crux of this chapter is that, if we want to save flora, we first have to *see* flora, and so it underscores the need for more consideration for the verdurous world, one that transcends appellations such as timber or anthropomorphic constraints.

In the second chapter, ‘Appetite for Bio-Destruction: An Examination of the Scale and Rate of Biomass Decline in *The Three-Body Problem* and *The Long Earth* Series’, I discuss the use of insects in both series as metaphors for the human destruction and consumption of plant biomass, with a particular emphasis on deforestation. This chapter demonstrates the rate at which the denudation of an entire planet can happen; as readers observe the swift transformation from the verdurous, to the vacant. The wider purpose of this chapter is to underline the need to confront and redress our problematic and edacious relationship with the rest of the biosphere, lest we do in fact metamorphose into the insects that are the subject of our science fictional comparisons.

The third chapter, ‘The Trials and Tribulations of Plant, Animal, and Human(oid) Subjects: Intersectional Oppressions and Exploited Bodies in *The Three-Body Problem* and *The Long Earth* Series’, addresses the relationship between the violence exacted on women, animals, plants, and the poor, and the processes of species exclusion and exploitation at the hands of humankind in both series. It argues that all entities on this planet deserve moral consideration, irrespective of species, sex, class, etcetera. In its critique of the construction of women as meat, trees as timber, and poor people as beneath concern, as well as trolls as no more than units of forced labour, it finds that we need to reconceptualise our relationship with the rest of the biosphere, as mere ‘stuff’ to serve the needs of others, and underlines that violence and abuse toward the rest of our kin with whom we share the planet, whether human or otherwise, must be stopped.

Chapter four, ‘Trees with Three Faces: A Cross Section of the Malevolent and the Benevolent Forest in *The Long Earth* and *The Three-Body Problem*, and the Growth of the Woodland-in-Peril’, then discusses the dualistic delineation of forests as either malevolent or benevolent environments in each series. It draws on the fiction of the Brothers Grimm, J. R. R. Tolkien, and C. S. Lewis in order to explore these two trends in how forests are characterised across literature and popular culture, and then looks at a third nascent representation of the forest as an imperilled landscape in need of protection in the work of Rachel Carson and Amélie Fléchais. I argue that, while forestscapes are often depicted as terrible loci, these environments can also be delineated as fantastical places of wonder and solace. It also argues that the transition from the tradition of the malevolent forest to the woodland-in-peril heralded a new dawn in our cultural approach to forests, as we have come to see that the true threat does not take the form of the forest and its concomitant wolves and other inhabitants, but rather comes from without, in the form of humankind. It concludes that, if we want to preserve our woodlands, what we need are more works that seek to reform our collective approach to this vilified environment in their recharacterization of the woods as threatened and vulnerable, so as to avoid a future in which forests only exist in the realm of the fictional.

The fifth chapter, ‘From the Forestscape to the Technoscape: The Radical Abundance of Nanotechnology and its Environmental Ramifications in *The Long Earth* and *The Three-Body Problem*’, transitions from an emphasis on flora and fauna, in order to consider the field of nanoscience and its environmental impact in each series. It also assesses how anxieties about nanoscientific developments expressed in science fiction and in wider nanodiscourse compare with the experimental science of the real world. This chapter argues that, while nanoscience could lead to marvellous future applications, it could also have an adverse environmental impact. It finds that anxieties about nanotech that tend to revolve around

nanobots and nanoweapons still persist across popular culture, from science fiction to cartoons, and concludes that there is much we still need to know about the risk that this field could pose to human and environmental health before we can look to the nanofuture.

The sixth chapter, 'Earth versus the Extraterrestrial: Alien Worlds and the Fate of the Planet in *The Three-Body Problem* and *The Long Earth* Series', confronts extraterrestrial contact in both series and what this entails for their respective worlds, for good or ill. It argues that alien encounters in both series are on the whole of a malevolent rather than a benevolent nature, and readers can thus conclude that, while it is safe for humankind to search for life elsewhere in the cosmos, it is not prudent for us to attempt to communicate, if we value the planet and all that it holds within.

The final chapter, 'Video-Games as Visions of Tomorrow: A Video-Ludic Window into Worst-Case-Scenario Environmental Futures in *The Three-Body Problem* (2006)', focuses on the use of a video-game in book one of *The Three-Body Problem* series as a metaphor for the real-world climate crisis. This chapter argues that video-ludic environments should not be lumped under an umbrella and criticised as childish or as frivolous escapism, but that these virtual worlds should instead be valorised as a potent cultural medium with which we can disseminate complex environmental issues. It underlines that we should celebrate video-ludic recreation as a crucial part of a cultural response to, and simulation of, the environmental crises of the present epoch. The conclusion then brings the argument together and points to continuing work in this field.

0.5: Methodology and Approaches

The Three-Body Problem and *The Long Earth* series examined throughout this thesis are a small but representative sample of a wider, burgeoning movement of environmental science

fiction, which it was beyond the scope of this project to discuss. This includes recent works such as *The Waste Tide* (2013) by the Chinese science fiction author Chen Qiufan, a near-future novel which confronts the critical issue of e-waste (electronic waste) pollution; Emmi Itäranta's *Memory of Water* (2014), a novel set in a dystopian future in which, due to the climate crisis, water is scarce and leads to water wars; and Nina Munteanu's *A Diary in the Age of Water* (2020), in which water on our planet is a relic of a pre climate crisis past. This is not to mention the entire oeuvre of Kim Stanley Robinson, whose most recent novels, such as *New York 2140* (2017) and *The Ministry of the Future* (2020), the latter of which was touched upon in this introduction but which deserves so much more attention, deal with a host of environmental calamities in both the near and distant future of our planet which are the result of an indifference to the climate emergency. Therefore, future research is vital in order to continue to draw attention to and build upon this field, and its critique of, and response to, a world that is in the throes of environmental turmoil.

This sub-section of the introduction underscores the combination of research methods and approaches used throughout this thesis. These involve close textual analysis of both sets of primary texts, *The Three-Body Problem* and *The Long Earth* series, with research drawn from a wealth of disciplines that consist of science fiction studies, ecocriticism (and its various branches that include critical plant studies, ecofeminism, and critical animal studies), environmental science, nanotechnology, games studies, and other literary genres such as fantasy and fiction written for children. This multifaceted, interdisciplinary approach is needed in an examination of science fiction as a result of its wide scope and rich engagement with other research fields and literary genres. Science fiction is a literature that encompasses a breadth of topics as numerous as the moons of Jupiter, and subsequently depends on a breadth of research with which to help unpack it. For instance, if we consider that so much of the content of science fiction is rooted in scientific knowledge, this means that it is often

essential to have a solid foundational comprehension of certain areas of scientific research in order to be able to wholly understand and unravel the ideas in these creative works (the field of nanoscience is a case-in-point in this thesis, for example). I believe that the combination of literary precision and interdisciplinary breadth of reference that I weave throughout this thesis enables readers to have a much deeper awareness of the various environmental concerns raised in both *The Three-Body Problem* and *The Long Earth* series. This networked approach helps us to better understand the ways in which these books—with their multiple tendrils in other fields and genres—respond to real-world eco-crises and future environmental anxieties.

In order to approach the topic of environmental discourse in *The Three-Body Problem* and *The Long Earth* series, each of the seven chapters that follow this introduction will be underpinned with a broad ecocritical framework. The first chapter of this thesis, which critiques the delineation of trees and other species of flora in both series as either exploited, invisible, or anthropomorphised components of the more-than-human world, is supported with one blossoming strand of ecocriticism, which is critical plant studies—a term that was first coined in the 2010s (see Lawrence, 2022, 633). This emergent thread of ecocritical discourse examines the representation of the vegetal world and human-plant relations in literature and wider popular culture. The predominant tenets of critical plant studies are that 1: flora tend to remain outside of our moral consideration (see for instance Hall, 2011; Marder, 2013; Gagliano et al, 2019), and 2: if we hope to re-envision the relationship between humankind and the botanical world, it is crucial for depictions of plant life in popular culture to transcend those of instrumental human-plant relationships, routine instances of 'plant blindness' (see Wandersee and Schussler, 2001), and the ill-founded notion that plants are just like us and not 'autonomous complex lifeforms' (Woodward and Lemmer, 2019, 23). This budding strand of ecocriticism is an important one to consider within this critical field, for without plants, life on this planet would not be possible. In this

epoch of environmental turbulence, in which deforestation and other acts of plant maltreatment abound, now more than ever it is of vital importance that we understand how we should approach flora, and how to behave in a more ethical manner towards the verdant world. The final part of this first chapter also draws on material from popular science about flora, such as *The Hidden Life of Trees* (2015) by Peter Wohlleben, and recent research in the field of botanical science, with an emphasis on plant behaviour and whether or not plants feel pain. These two strands are vital to consider, for while both endeavour to promote the worth of plants, it is also valuable to see the extent to which the vegetal world as delineated in both eco science fiction and popular science marries up to real-world research on plant characteristics.

The second chapter also examines the plant sphere in *The Three-Body Problem* and *The Long Earth* series. However, the focus shifts from the problematic way in which we speak about and see flora to the use of insects as metaphors for the dire human impact on plant biomass—with 'two in five plants' now threatened with extinction (Royal Botanic Gardens Kew: State of the World's Plants and Fungi Report, 2020, 11). The introduction to chapter two addresses a slew of recent scientific data on the current state of plant biomass assessment, the overall conclusions of these calculations, and what these mean for life as a whole on this planet. This is a crucial first step to take in undertaking this chapter, as it situates the magnitude of plant biomass depletion in the real-world—and why it matters—within the minds of readers prior to the critiques of its fictional (but equally dreadful) treatment in each series. The remainder of this chapter is a close textual analysis of the delineation of humankind as forest-devouring insects in *The Three-Body Problem*, and general biomass-destroying insects as emblems of humankind in *The Long Earth* series. This turns to a combination of environmental science and older science fiction in order to support its exploration of this theme. For instance, the sub-section on *The Three-Body Problem* series

draws parallels with a significant work of environmental scholarship in the form of *Silent Spring* (1962) by Rachel Carson. This book is an important one to draw upon, not just for the more apparent reason that it is cited in *The Three-Body Problem* series, but because the concerns that Carson raises in this seminal text about the adverse effects of human actions on the planet are still pertinent today, given that the world is in the midst of a climate crisis and sixth mass extinction event. The sub-sections on *The Long Earth* series, meanwhile, form comparisons between the insects found in the fourth instalment of this series and those encountered in earlier science fiction short stories, namely, H. G. Wells' 'The Empire of the Ants' (1905) and Claire Winger Harris's 'The Miracle of the Lily' (1928). These are included because both of these tales also use insects in some manner to pass comment on the negative affect of humankind on the planet. The blend of science fiction and science fact used throughout this chapter is significant, because it does not just work to further underscore the world that we (un)make due to our actions and attitudes of indifference toward the more-than-human sphere, but it also acts as an additional set of prompts for us to want to reconfigure our poor relationship toward it.

Chapter three is underpinned with another two strands of ecocriticism in the form of ecofeminism and critical animal studies. Ecofeminist discourse stemmed from activist roots. Specifically, the 'feminist, peace, and the ecology movements' in the late 1970s and early 1980s (Mies and Shiva, 2014, 13). This critical framework is premised on the argument that women and the more-than-human world of flora and fauna experience comparable abuse as the result of a capitalist patriarchal world structure that perceives both groups as inferior, exploitable, and ultimately killable (see for instance Gaard, 1993; Mies and Shiva, 2014; and Adams and Gruen, 2014). It therefore calls for the liberation of woman and nature, and propounds the need for a new vision—a 'radical reshaping'—the crux of which is that, if we want to preserve life on this planet, then what we require is an *inclusive* rather than an

exclusive ethic of care (Adams and Gruen, 2014, 2). This particular thread of ecocriticism forms the basis of *The Three-Body Problem* section of this chapter, which centres on the ways in which violence toward women and girls, plants, and animals are intimately linked throughout the first instalment of this series.

In a similar vein to critical plant studies, this is another essential thread of ecocriticism to draw attention to in this thesis, due to its pertinence to the present. The core issue that ecofeminism addresses, namely, the linked domination of women and nature, persists to this day. While there are too many issues to discuss here, two noteworthy instances from the not-so-distant past include that of the U.S Supreme Court, which in June 2022, overturned *Roe v. Wade* and thus removed the nationwide constitutional right to an abortion. This meant that each state was now able to decide its position on the matter—with bans currently in place in thirteen states (see Noor, 2022). Another significant incident occurred in Iran in September 2022. In this case, a twenty-two-year-old woman named Mahsa Amini was detained by the 'morality police' for wearing 'bad hijab' (Mohammadi, 2022, n.p.). Maryam Mazrooei writes that these police 'hunt women who do not properly hide their female bodies, and arrest them using a snare pole', which is an instrument used by animal control officers (2022, n.p.). Amini later died in police custody, which sparked a female-led revolt in which thousands of protesters removed their headscarves and took to streets across the country in order to make a stand against Iranian hijab laws and to express a demand for freedom, despite the risk of suppression with violent force. Both of these recent examples can be linked to the ongoing experience of our animal kin, who, like women, also remain less free than mankind, both in the functioning of their own bodies, and in the paths of their own lives. For example, cows farmed for milk production continue to lack bodily autonomy; their short lives a cycle of repeated impregnation by artificial insemination (see for instance Adams, 2021; Jacobs, 2020). The ongoing practice of factory farming, means that animals such as chickens raised

for eggs and meat are also still denied freedom; forced to spend their entire lives confined in unnatural, crowded conditions, before they are killed and turned into products for consumption (see for instance Bobier, 2019; Adams 2020).

Critical animal studies, however, is a field that examines the representation of creatural life and the relationships that exist between humankind and our animal kin in literature and wider popular culture. In terms of its inception, Nik Taylor and Richard Twine write that while 'an explicit statement of self-consciously *critical* animal studies did not emerge until the beginning of this century, reflexivity toward the human exploitation of other animals, and an emergent politicisation of the violence this entailed, began to appear alongside second wave feminism in the 1960s and 1970s' (2014, 4). While a key aspect of critical animal studies is to call on us to 'show the proper respect for, to take seriously as subjects of experience, the animals whose lives are represented in cultural texts', this strand of ecocriticism concerns much more than this delineative slant (McKay, 2014, 637). This is because 'critical animal studies scholars aim to end animal exploitation and suffering and have little patience for work that just happens to be about animals' (Kim and Freccero, 2013, 464). Animal advocacy is a cornerstone of critical animal studies, and involves various methods that include making visible the obfuscated spaces that comprise the global 'animal industrial complex' in which these abuses occur, such as research labs, farms, and abattoirs (Noske, 1989, 22). It also entails working to contest speciesism—the assumption of human exceptionalism which leads to the oppression of the more-than-human world. Those involved in critical animal studies seek to help us to overturn our instrumentalist relationships toward other animals, either as tools for research, foodstuffs on supermarket shelves, or as spectacles in the entertainment sector, in favour of social justice for animals and more ethical relationships with our animal kin. Due to its explicit association with the animal rights movement and 'boots on the ground' activism and education, critical animal studies therefore

differ from the approaches of mainstream animal studies and its production of 'obscure theories for elite consumption' (Sorenson, 2014, xxviii). John Sorenson expands on this concept when he explains that critical animal studies 'supports a range of tactics, including direct action to rescue animals, civil disobedience, and vegan education. It does not pretend to take a neutral or supposedly objective and detached approach to the exploitation of animals, but directly expresses its opposition to such practices and its support for alternatives' (2014, xxii-xxiii).

This area of research provides the foundations for *The Long Earth* series part of the third chapter, which examines the use of ape-like creatures called trolls in scientific experimentation, forced labour, and folk medicine in the second instalment of the collection. This sub-section links the experiences of the trolls in this novel with animal experimentation in the real-world in order to demonstrate that the status of animals as objects of (ab)use has a dark and extensive history outside of science fiction. For example, it makes a direct connection between a troll cub used for space research in the novel that the humans name 'Ham', and the real-world Ham who was the first chimpanzee sent into space in 1961 (see Gaard, 2017). Drawing on the work of critical animal studies scholars such as Jason Hribal in his book *Fear of the Animal Planet: The Hidden History of Animal Resistance* (2010), it also establishes a connection between the violent act of resistance undertaken by the mother of this troll cub in the novel, and various real-world incidents of animals confined in circuses, zoos, and science labs who have revolted against human perpetrators of abuse, and who are often killed for these acts of retaliation. The comparison that this sub-section makes between animal maltreatment in *The Long Earth* series and in the final instalment of *The Chronicles of Narnia* series, also emphasises that the abuse of animals evidenced in this chapter does not just cross from the real-world into science fiction, but is also (alas) a cross-genre phenomenon.

The import of critical animal studies, much like that of critical plant studies and ecofeminism, cannot be overstated in the present epoch of environmental crisis. Our approach to animals has unfortunately not shifted much since the birth of critical animal studies. Instead, the overall situation of animals remains somewhat inert given that the most common forms of the oppression and commodification of our animal kin persist. To provide one salient example, the number of animals killed worldwide for the global meat industry is still astronomical. Precise numbers are difficult to ascertain, particularly as those killed for meat per species are often described in industry statistics in terms of 'weight' as opposed to 'distinctive individuals', in a quantification of mass rather than a quantification of life (Matsuoka and Sorenson, 2018, 3). However, what we do know is that worldwide meat consumption is higher than ever, with the average amount of meat consumed per person globally nearly doubling in the past fifty years (see Weston, 2022; Devlin 2018). This massive demand for meat is inextricably tied to the urgent concern of environmental destruction. For instance, not only does the global meat industry account for nearly sixty percent of all greenhouse gases from food production (see Milman, 2021) but the bulk of deforestation worldwide also has a direct link to the livestock industry, as swathes of land are cleared to create pasture and produce animal feed, leading to the destruction of wildlife habitat and so a higher risk of extinction for many endangered species (see Sorenson, 2014, xii). If we want to save not just humankind from an ethical point-of-no return, but also rescue the planet from eco-catastrophe, it is crucial that we put a stop to animal exploitation in all its forms. The field of critical animal studies offers an essential space with which to enable this to happen, in its provision of a critical discourse that helps persuade more and more people to re-assess and redefine their relationships with our animal kin.

The fourth chapter, which examines delineations of forestscapes in *The Three-Body Problem*, *The Long Earth* series and wider literature, first turns to the representation of the

forest as malevolent across a wide selection of fiction and film from the classical period until the present in order to underline that this particular approach to the woodland is deep-rooted in popular culture. It is important for us to first understand this history in order to then see the ways in which this embedded idea of the terrible forest is either upheld or undermined in each series, as well as in the other works of literature that I draw various parallels with across this chapter. The introduction to this chapter also links the idea of the evil forest, which has led to the development of a widespread fear of this environ, with leading ecocritical thinkers such as Simon Estok (2020) and his theory of 'ecophobia'. This is a significant term that Estok coins to describe a fear or hatred toward the natural world that, crucially, affects our response to environmentalism. The first sub-section after the introduction, which turns to the relationship between fairy tales and a dread of the forest in *The Three-Body Problem* and *The Long Earth* series, commences with an overview of the treatment of woodlands in the stories of Jakob and Wilhelm Grimm. This is so we can see that forests in children's literature are saturated with associations with terrible creatures and events. We need to be aware of this superabundance of the hostile woodland in children's fiction in order to trace why the characters in both of these series react in a such a negative way toward forests. This dominant depiction of forests as wicked is also crucial to unravel in this chapter for another reason, however, which relates to modern environmental concerns. This is the idea that the evil forest 'threatens not only the characters in these stories but also any effort to encourage environmental awareness', because what child wants to work to save what, in their view, is a horrible place? (Sakrisson, 2020, 12).

The latter section of chapter four draws parallels between the idea of the benevolent forest encountered in book one of *The Long Earth* series and the fiction of J. R. R. Tolkien and C. S. Lewis. This part of the chapter is a close textual analysis of novels from two different genres; science fiction, in the form of *The Long Earth* (2012); and fantasy, in the

form of *The Lord of the Rings: The Fellowship of the Ring* (1954) and *The Chronicles of Narnia: The Magician's Nephew* (1955). While it does not therefore exclusively address science fiction, I have approached this section of the chapter in this manner in order to show that, despite the plethora of stories in popular culture about forests as hostile environments, there are also a number of familiar works that seek to celebrate these arboreal domains as positive spaces. With this cross-genre method, I underline that, despite their conventional differences, the stepwise forest in *The Long Earth*, the Elven Forest of Lothlórien in *The Lord of the Rings*, and the Wood between the Worlds in *The Chronicles of Narnia* all share a common virtue—as wonderous places that offer solace from the terrible environments and entities that lie without, and where humankind and the more-than-human world can coexist without strife. The final part of this chapter turns to another representation of the forest that has started to appear in literature and wider popular culture, which is that of the woodland as imperilled as opposed to its routine dualistic delineation as either malevolent or benevolent. While this is not a depiction encountered in *The Three-Body Problem* or *The Long Earth* series, I have chosen to examine it in this chapter as it is a vital part of the discourse that surrounds the characterisation of woodlands in popular culture. The two books discussed in this sub-section, namely, *Silent Spring* (1962) and *The Little Red Wolf* (2014) are notable because both demonstrate that, as time has passed and our perception of forests has shifted due to the environmental crisis that our planet faces, so too have representations of woodlands in literature experienced a metamorphosis—one that reflects this reshaping of our relationship with these verdurous environments.

Chapter five introduces a more techno-scientific dimension to this thesis in its examination of nanotechnology and its environmental consequences in *The Three-Body Problem*, *The Long Earth* series, and in the real-world. In the introduction, I first define what the field of nanoscience is and provide a contextual overview of its inception, those

associated with its roots, its potential for good and evil, and its enmeshed relationship with science fiction. I draw on a number science fiction texts that address nanotechnology in different manners that include Henry Hasse's *He Who Shrank* (1936); Robert Heinlein's *Waldo* (1942); Will McCarthy's *Bloom* (1998); Michael Crichton's *Prey* (2002); and Alistair Reynolds' *Century Rain* (2004). I also discuss two essential works from what are considered to be the scientific fathers of nanoscience. These consist of Richard Feynman's 1959 lecture, 'There's Plenty of Room at the Bottom: An Invitation to Enter a New Field in Physics', and K. Eric Drexler's seminal book *Engines of Creation: The Coming Era of Nanotechnology* (1986). While the introduction to this particular chapter is a little more substantial than its counterparts, such a detailed contextual backdrop is important, considering that nanotechnology is not a prevalent topic. The sub-section on *The Long Earth* series is a close textual analysis of the final instalment in the collection, *The Long Cosmos* (2016) and its treatment of a worst-case environmental nanoscenario known as 'grey goo' (see Drexler, 1990, 172). This part of the chapter compares and contrasts the careless creator and his liberated creation found in this novel with those encountered in an earlier work of science fiction, namely, Mary Shelley's *Frankenstein* (1818), in order to underline what can transpire when scientific ambition trumps caution.

In the section on *The Three-Body Problem* series, which explores another fear about nanotechnology in the form of the creation and use of nano-weapons, I turn to the work of the physicist Louis A. Del Monte in his book, *Nanoweapons: A Growing Threat to Humanity* (2017), in order to show that this risk scenario is a concern about advancements in nanoscience that is also situated both within and outside of the domain of science fiction. It also draws parallels with *The Lazarus Vendetta* (2004) by Robert Ludlum and Patrick Larkin. This is an earlier science fiction novel in which we encounter nano-weapons. I opted to discuss this in this sub-section not just due to its relation to *The Three-Body Problem* series,

but also because it demonstrates that, in a similar vein to the gray goo scenario, this concern has also (but to a much lesser extent) become a trope that surrounds nanotechnology in popular culture. The final part of this chapter leaves science fiction behind in order to address a crucial question, namely, whether or not the anxieties that surround nanoscience in literature and wider popular culture warrant our attention in the real-world. In order to address this issue, this sub-section draws heavily on a number of recent scientific research papers from a branch of nanoscience known as 'nanoecotoxicology', which is the examination of potential adverse effects of nanomaterials on the environment (Kahru et al, 2010, 107). This is a vital approach to take at the end of this chapter in order to underscore that, while current concerns about this particular field are much less fantastical than what we are led to believe in popular culture, fears about the environmental impact of nanomaterials remain valid. However, this sub-section also underlines that, due to its status as an emergent field, there is much more research to be done in this area if we want to achieve a clearer awareness of the potential eco-ramifications of nanomaterials.

The sixth chapter shifts focus once more and critiques delineations of the search for and communication with extraterrestrial life in *The Three-Body Problem* and *The Long Earth* series. The introduction briefly presents both sides of the extraterrestrial debate in academia—the contact optimists versus the contact pessimists. It is subsequently underpinned with scholarship from the likes of the astronomer and science fiction author David Brin (2019) who underlines the risks that this could entail for humankind and the more-than-human world, and scientists such as Gilbert Levin (1968), who instead emphasise the thrill that one could obtain from an extraterrestrial encounter. In the sub-section on *The Three-Body Problem* series, I draw parallels between the Trisolarans in this collection with the Martians encountered in an earlier science fiction novel—and the quintessential alien invasion text—H. G. Wells' *The War of the Worlds* (1898). This is because both of these

narratives share two core similarities. The first of these is that the extraterrestrials in each of these texts do not set about an invasion of planet Earth out of malice, but because neither civilisation can survive for much longer on their dying home worlds. The second is that both the Trisolarans and the Martians perceive the Earth as a veritable paradise compared to their own planets—a social commentary on the fact that, all too often, humankind take this world for granted.

The approach that I take toward the first sub-section on *The Long Earth* series, which looks at human-alien encounters and their western imperialist-colonial overtones in the third instalment in the series, *The Long Mars* (2014), is underpinned with several works of science fiction criticism. These consist of chapters and articles from scholars such as Peter Fitting (2000), John Rieder (2008), Gwyneth Jones (2018), and Sherryl Vint (2021), all of whom to a greater or lesser extent address the relationship between alien encounters in science fiction and the western exploration and conquest of other peoples and lands. The last section of chapter six turns to the final book in *The Long Earth* series, *The Long Cosmos* (2016), and its revelation of an invitation sent from the stars for all the inhabitants of the stepwise worlds to become part of a cosmic civilisation. I compare this book with the earlier science fiction novel *Contact* (1985) by Carl Sagan. I have chosen to do this because both of these works have much in common in their approach to extraterrestrial encounters and are crucial examples of the amicable alien in a sea of hostile aliens in science fiction. In both *The Long Cosmos* and *Contact*, the characters receive an invitation from another world, complete with blueprints to build a machine with which to respond. A debate ensues in both texts about whether or not to build the machines, in case they wreak havoc instead of harmony. When these devices are constructed, the characters in each text are transported to the centre of the universe. However, here the two novels diverge. While in *Contact* the humans encounter the extraterrestrials that sent the invitation, this does not occur in *The Long Cosmos*.

In the seventh and final chapter of this thesis, I concentrate on the first book in *The Three-Body Problem* series and its inclusion of a video game (*Three Body*) as a metaphor for the real-world climate crisis. The introduction to this chapter first turns to games studies scholars such as Gordon Calleja (2011) and Alenda Chang (2019) as well as the modern cultural historian Johan Huizinga (1949). This is because each of these scholars confront the idea that play, and video-ludic worlds in particular, are synonymous with escapism from the real-world—an element that is essential to put at the forefront of this chapter so that readers are then primed to understand the ways in which this idea is disrupted in the novel. I also broach the relationship between digital games and ecocriticism here, and the appearance of an emergent strand of ecocritical scholarship in the form of videoludic ecocriticism, as this forms the framework of this chapter. *Playing Nature: Ecology and Video Games* (2019) by Chang is a significant book that I draw upon in this part of the introduction. This is because, as the first (and recent) book on video games and the environment to be published, I believe that it is set to become a seminal text in this particular area of research. The introduction also discusses notable examples of eco-aware video games from the real-world such as *SimEarth: The Living Planet* (1990) and *Final Fantasy VII* (1997) in order to emphasise the power that videoludic worlds can have on the development of our environmental consciences—a point that is subsequently reinforced in the examination of the in-text *Three Body* game.

The Three-Body Problem part of this chapter links its discussion of the *Three Body* game in the novel not just with the game studies scholars discussed in the introduction, but with other key researchers in this field that include Tanya Krzywinska and Esther MacCallum-Stewart (2011), P. Saxton Brown (2014), and Colin Milburn (2018). It also makes connections between various circumstances in the *Three Body* gamescape and works of environmental science such as Carson's *Silent Spring* (1962) and *Our Angry Earth* (1991) by Isaac Asimov and Frederik Pohl. In addition, it delves into research on scalar politics in

ecocriticism, environmental science, science fiction, and digital games, and therefore turns to the work of core people in these areas that include Will Wright (2007), Nathan Sayre (2010), Rob Nixon (2011), Timothy Morton (2013), and John Timberlake (2018). I return to *Final Fantasy VII* in this part of the chapter in order to demonstrate the similarities between it and *Three Body* in the measures taken in their respective virtual worlds to protect their planets. However, I also contrast this videoludic world in the novel with other real-world digital games such as *Minecraft* (2011), *Don't Starve* (2013), and the *Far Cry* series (2004-2021). This is to underline the ways in which *Three Body* diverges from the convention in video games for the environment to solely exist either as a place for resource extraction to support player activity or as an aesthetic backdrop that receives minimal attention.

Chapter One

The Death of the Forest: Bio-Erasure as a Consequence of Plant Blindness and Plantsploitation in *The Three-Body Problem* and *The Long Earth* Series

1.1: Introduction

The biodepletion and erasure of our forests occurs in a manner besides that of the actual acts of violence committed with either chainsaw or axe. While this is the obvious final curtain, both *The Three-Body Problem* and *The Long Earth* series underline that forestscapes are equally imperilled due to the words we use to describe them—a lexicon that rejects their existence as vibrant communities, and instead perpetuates a discourse of forests either as passive resources, or as anthropomorphised entities stripped of their own unique qualities. The language we use with respect to the natural world can be as much of an act of violence—of a routine and often overlooked sort—towards the environment as somatic assaults, and, as such, should be approached in a similar manner. With this in mind, Karen L. F. Houle, in her recent chapter on language use and linguistic responsibility, argues that we must contemplate '*linguistic justice*, where rightness and wrongness—and hence culpability—are located in and around word use, the way that words, utterances, gestures, statements, and symbols shape realities for better and for worse' (2019, 158).

This chapter concerns the effect that words have on how we conceptualise the plant sphere. It considers the ways in which both *The Three-Body Problem* and *The Long Earth* series foreground plant lives, and the relationship between humankind and the verdurous domain as constructed and reinforced through language. The various vegetal-human

interactions in both series also demonstrate that eco-science fiction is a potent instrument with which to 're-landscape the world by seeing it with different eyes' (Timberlake, 2018, 38). This is an idea that resonates with what Darko Suvin characterises as 'cognitive estrangement' (1979, 4). This is a concept that articulates how science fiction 'places readers in a world different from our own in ways that stimulate thought about the nature of those differences, causing us to view our own world from a fresh perspective' (Booker and Thomas, 2009, 4). While both of these narratives are set in this world, but with differences such a time-frames or a plurality of planets, each turns commonplace ideas about the plant sphere on their head, and shows that flora can transcend the predominant discourse replete with appellations such as timber. Instead, both series demonstrate that plants are complex entities that merit more care and consideration than received at present. We can hope that when we discover more about the capabilities of flora, whether via science fact or science fiction, how we speak about and interact with the verdurous world will be altered as well, and we can save the plant sphere from utter destruction.

1.2: The Lexicon of Lumber: Destructive Discourse and the Dahurian Larch Tree that Dies Twice in *The Three-Body Problem* (2006)

The Three-Body Problem (2006) is a novel that includes an explicit treatment of the sheer scale of deforestation executed in China throughout the Cultural Revolution, and concurrent implicit critical commentary on the rapid denudation of the planet in its entirety. Our first encounter with a forest in this tale is one in which it has fallen to axe and chainsaw, but alas, also due to words. The first word in the introduction to the forest in the narrative, which hails from the character of Ma Gang, who nonchalantly announces 'Tim-ber…', epitomises the ways in which we, as a species, are culpable of dismissing plants in our use of certain words and phrases when applied to the natural world (Liu, 2016, 19). This one word—the first of

two—must be problematised, as it collapses trees as sentient entities into that of lifeless wood, and aptly demonstrates what Andrew Smith and William Hughes define as 'the linguistic sleight of hand that turns bodies into commodities' (2013, 12). When humans 'speak about nature as stuff' in this way, writes Houle, and 'if this is the only way you write or speak about nature, then it is the only way you will see nature. Eventually, everything except your own position will start to look like generic "stuff out there"' (2019, 166-167).

It is due to this fabricated frontier between us (as that which is deemed to be alive) and them (as objects or alienable products), or rather, people versus plants, a boundary that is reinforced through our language, that we are forced to witness the valorisation of the world's forests as an exploitable 'standing-reserve' first and foremost (Heidegger, 1977, 27). This means that plants are not permitted a valid existence without profitable outputs, and are only secondarily perceived, if at all, as sentient and symbiotic entities. As Michael Marder writes in *Plant Thinking: A Philosophy of Vegetal Life* (2013), 'the woods are treated as nothing more than wood, a mass of lumber "produced" in a gigantic and infinitely stocked factory of planetary proportions' (30). When we speak of the forest, as is the case in *The Three-Body Problem*, as mere timber, we perpetuate the view that forests, to quote Marder, are simply 'wood awaiting its elevation', or rather, 'the sublation of its immediate existence into the form of a house, a page in a book, or logs in the fireplace' (2013, 31). The lungs of the planet become, due to a lack of linguistic justice, little more than incomplete objects for human consumption.

Plant life suffers further injustice due to words in the narrative in a conversation that takes place between Ma, the 'fastest chainsaw operator' in the 'Inner Mongolia Production and Construction Corps', who has just felled one of the Dahurian larch trees that dwell within the forest, and Bai Mulin, a 'reporter for the *Great Production News*, the corps' newspaper'

(Liu, 2016, 19, 21). For Bai, this is a deplorable act of violence that has been exacted on the natural world. When Ma proudly tells him that he felled the tree in less than 'ten minutes', Bai exclaims that it has lived for 'more than three hundred years! A dozen generations', and that 'when this tree was but a shrub, it was still the Ming Dynasty. During all these years, can you imagine how many storms it has weathered, how many events it has witnessed? But in a few minutes, you cut it down. You really felt nothing?' (Liu, 2016, 21). Whereas Bai expresses sorrow over its downfall, this sentiment does not find its parallel in Ma, who, with 'a blank look' retorts, 'what do you want me to feel?' (Liu, 2016, 21-22).

The chasm that exists between these two characters in relation to the life and death of this tree, resonates with the words of William Blake, who, in a letter to one Dr Trusler in August 1799, reflects that 'the tree which moves some to tears of joy is in the eyes of others only a green thing that stands in the way' (1972, 793). Ma's sense of detachment from his actions is further reinforced in his response to Bai that 'it's just a tree. The only things we don't lack around here are trees. There are plenty of other trees much older than this one' (Liu, 2016, 22). The second word that must be problematised in *The Three-Body Problem* is subsequently that of 'just'—an apathetic disregard for life within environmental rhetoric. 'Just' is a four-letter word with much to unravel, and one that demonstrates that the campaign for linguistic justice is of the utmost importance. When a plant or any other entity is reduced to the status of a 'just' or an 'only', these little terms are 'used to exempt violent encounters from the norms of morality' (Vint, 2014, 35). When we use such words in our discourse about both humankind and the more-than-human world, these terms are used to justify violence, or any use, of plant, animal, or human 'others', even their deaths, for our own purposes.

This indifference that we exhibit towards the lives of other entities as expressed through our choice of language recalls Donna Haraway, who writes that 'it is not killing that gets us into exterminism, but making beings killable' (2008, 80). While for Bai the Dahurian larch is an entity that deserves respect, and its loss should be mourned, it is evident that for Ma, just as the animal is 'always-already meat', the tree is always-already timber—an object that can be taken down without ethical dilemma (Vint, 2014, 28). Ma's actions in *The Three-Body Problem* reinforce the point made by Rachel Carson in her seminal work, *Silent Spring* (1962), that 'our attitude towards plants is a singularly narrow one. If we see any immediate utility in a plant, we foster it. If for any reason we find its presence undesirable or merely a matter of indifference, we may condemn it to destruction forthwith' (2000, 69). In *Through Vegetal Being: Two Philosophical Perspectives* (2016), Luce Irigaray argues that 'we act towards vegetal beings as toward inanimate things, outside any consideration for living relations with them and between them' (90). This approach to plant life as no more than resources or objects is embodied in the character of Ma, who, as underlined by his choice of words, does not see that plants have lives too. Not only is he blind to the lifespan of the tree that he has felled, its experiences as an individual, its species, and its part in the community of the forest, but he is also blind to the fact that, without plants, life on Earth would collapse. The Dahurian larch dies twice in this narrative—once by the chainsaw and once due to an environmental apathy in which a tree is 'just' a tree. This notion of 'just a tree' reduces the larch to a mere piece of material as opposed to a sentient entity—and it is thus denied its own existence.

1.3: Parallel Worlds, Parallel Plantsploitation in *The Long Earth* Series (2012-2016)

In *The Long Earth* (2012), Terry Pratchett and Stephen Baxter also draw attention to this linguistic dismissal of forests as sentient communities. When interviewed about the sudden new-found access of humankind to multiple worlds that are a mere sidestep away, one of which is also later referred to exclusively in resource terms as a 'timber world', Professor Wotan Ulm states that these infinite parallel Earths have one feature in common, in that 'they are empty. Well, actually they are full, mainly of forests and swamps. Big, dark, silent forests, deep, clinging, lethal swamps. But empty of people. The Earth is crowded, but the Long Earth is empty' (Pratchett and Baxter, 2013, 284, 16). The reiteration of these worlds as vacant landscapes emphasises the failure of humankind to notice the fact that plants are also animate entities. This quotation is an explicit reminder that, all too often, our perception of plants is one in which flora are seen as the backdrop to human life.

James H. Wandersee and Elisabeth E. Schussler have defined this 'inability to see or notice the plants in one's own environment' as 'plant blindness' (2001, 3). They argue that this is a condition that leads to '(a) the inability to recognize the importance of plants in the biosphere, and in human affairs; (b) the inability to appreciate the aesthetic and unique biological features of the life forms belonging to the Plant Kingdom', and '(c) the misguided, anthropocentric ranking of plants as inferior to animals, leading to the erroneous conclusion that they are unworthy of human consideration' (Wandersee and Schussler, 2001, 3). The fact that plants are looked upon in these parallel worlds and then disregarded due to this human condition also reads as a comment on what Shula Marks terms 'the myth of the empty land' (1980, 7). The misconception of these worlds as devoid of (human) inhabitants morphs into the justification for human colonisation. When Professor Wotan Ulm describes the Long

Earth as empty, it is a symptom of the processes of exclusion that we routinely enact towards vegetal life. In his public avowal of these worlds as lifeless because they are devoid of people, Ulm renders nature 'as an insignificant Other, a homogenised, voiceless, blank state of existence, a perception of nature that helps justify domination of the Earth'—or, in this case, the control of Earths plural (Hall, 2011, 1).

There are several notable instances of plant blindness in action in *The Long Earth*, not all of which can be chalked up to indifference alone. Wandersee and Schussler argue that instead of the invocation of anthropo- and zoocentric biases as the root cause of plant blindness, there is also a 'a visual-cognitive-societal basis' that elucidates this affliction in which plants are overlooked entities (2001, 6). A little while after Joshua Valienté has commenced his across-worlds expedition into the Long Earth on an airship, we read that 'mostly he saw tree-tops. The Long Earth was big on tree-tops. Earth after Earth, tree after tree. Joshua seldom got bored. But as the morning wore on, he was surprised to find himself growing bored now, so quickly. After all he was looking over thousands of landscapes no one, probably, had ever seen before' (Pratchett and Baxter, 2013, 148). This phenomenon in which an uninterested Joshua traverses worlds that blur into an endless verdure, can, write Wandersee and Schussler, be explained through visual-cognitive principles. While Joshua decries these worlds as monotonous due to their static and unexceptional appearance *prima facie*, Wandersee and Schussler state that we are, in a sense, *programmed* not to take notice of nondescript or 'vanilla' plants.

In plants without flowers or with inconspicuous ones, Wandersee and Schussler argue that 'the chromatic homogeneity, the spatial homogeneity, and the overlap of their green leaves makes edge-detection difficult', and that 'because green plants are typically static objects in the observer's field of view, seeing them and noticing them may pose much greater

problems of visual detection than dynamic objects do' (2001, 5). This scientific rationale, coupled with anthropocentrism, illuminates why, for Joshua, the individual trees and other plants of the worlds below his airship obfuscate into a conglomeration of 'green things'. When Joshua looks down on these forested worlds and is unmoved due to their similitude, he dubs himself the antithesis of the figure of 'stout Cortés' found in John Keats 1816 sonnet, 'On First Looking into Chapman's Homer' (Pratchett and Baxter, 2013, 148). Whereas Keats writes that Cortés 'star'd at the Pacific – and all his men / Look'd at each other with a wild surmise – / Silent, upon a peak in Darien', for Joshua there is no aesthetic pleasure or cosmic excitement about the exploration of these new worlds and their 'endless forest green', and so he espies them from the airship 'with somewhat of a tame surmise' (Pratchett and Baxter, 2013, 148-149; 2014, 310). This intertwines with another of the points that Wandersee and Schussler put forward vis-à-vis their visual-cognitive rationale for plant blindness—that 'humans tend to get bored and habituate if they look at a relatively constant scene for too long a time' (2001, 5). However, we must note that the indifference (read: plant blindness) of humankind to such 'bland' flora (and fauna) also occurs in this series on *terra firma*.

This is best illuminated on one Earth in particular, which Joshua and his companions examine on foot and which the narrative describes as having 'no grass or other vegetation – nothing but a sort of green-purple fuzziness, as if the land hadn't shaved that morning' (Pratchett and Baxter, 2013, 357). The narrator continues that 'there was simply *nothing here*. Joshua knelt down and, at random, levered up a little piece of the green fuzz. There were a couple of small beetles underneath; they weren't even interestingly iridescent, just mud brown. He let the piece of fuzz fall back again' (Pratchett and Baxter, 2013, 361). This occasion is yet another enactment of the visual-cognitive principle that our brains 'switch-off' or lose interest if plants (or animals) are not fireworks of colourful leaves or flowers (or, like the beetle here, do not possess vibrant exoskeletons). Joshua wishes to return to and

reconfigure this ‘dead place’ in the future, as illustrated when we read that ‘maybe, he thought, humans could bring this desolate world alive. Why not? He liked to fix things; this place could absorb a lot of fixing’ (Pratchett and Baxter, 2013, 359-360). However, Joshua’s notion to ‘remedy’ this planet fails to consider that each of these worlds, be they superficially realms of forest, desert, or ice, possesses unique features and life forms. Should this Earth be modified to suit a more extensive suite of life which includes humankind, these native species of plant and insect that are deemed so dull by the exploration party that they do not truly ‘see’ them and consider their value as alive entities, and are perhaps the only ones of their kind in the tremendously varied Long Earth, could be threatened with extinction.

It is significant to note that the forest and swamp worlds found in *The Long Earth* are only unfettered from their position as scenery and perceived as non-empty—the sticker of ‘*terra nullius*’ quickly removed—when these stepwise planets are considered lucrative (Pratchett and Baxter, 2014, 86). When the matter of exploitative profit comes to the fore, the plants and animals swiftly come to life and are ‘seen’, for a short spell, before they are instrumentalised as ‘products and commodities’ for humankind by those who work for the ‘transEarth Institute’, a centre that functions to ‘buy and sell commercially useful information’ about the stepwise worlds (Pratchett and Baxter, 2013, 108; 2014, 251). We witness this plantsploitation on one parallel Earth in particular, in which Joshua Valienté discovers and takes samples from ‘enormous man-high fungi’ that are home to ‘little mice-like creatures that had honeycombed them like Emmental cheese’ (Pratchett and Baxter, 2013, 238).

When his travel companion, Lobsang, an artificial intelligence in an ambulatory unit with an in-built mass spectrometer, consumes a piece of the fungi in order to break it down and analyse it, his verdict is that ‘a few pounds of the flesh of the giant mushrooms contained

enough proteins, vitamins and minerals to keep a human alive for weeks' (Pratchett and Baxter, 2013, 239). This leads him to conclude, with whatever the AI equivalent of cartoon dollar signs in his eyes is, that 'something that grows so quickly, contains all the nutrients a human being needs, and can flourish more or less anywhere, is undoubtedly something for the fast-food industry to take an interest in' (Pratchett and Baxter, 2013, 239). This episode, in which Lobsang, who is in the service of the transEarth Institute, views this fungi solely in terms of its potential profit when marketed to food corporations, recalls and functions as an unspoken reminder to readers of the events that transpire in John Wyndham's *The Day of the Triffids* (1951), a science fiction narrative in which humankind learns a harsh lesson regarding the removal of plants from their native soil in order to breed and exploit them elsewhere for economic gain.

While, in most subsequent versions of the narrative, the triffids are the result of terrestrial bio-experimentation, Jerry Määttä writes that 'they were actually from Venus in the earliest published version of the story' (2020, 42). In this first American version of the book, an 'abridged five-part serialisation in *Collier's* from 6 January to 3 February 1951 under the title "Revolt of the Triffids"', the research scientists share a similar expedition purpose to the character of Lobsang in *The Long Earth*, as both set out to explore other planets in order to see what is out there and whether or not it should be extracted from 'out there' and returned to Earth, should it prove to be a valuable resource (Määttä, 2020, 47). We read that, shortly into their quest, the research scientists learned 'that certain vegetable products which flourished on the planets were enormously valuable, both as food and for remarkable medicinal properties. The commercial exploitation of these products began almost immediately, and threw the world's markets into dizzying cycles of competition' (Wyndham, 1951, 64). The triffids are farmed on Earth 'on a large scale in order to extract valuable oils and juices, and to press highly nutritious oil-cake for stock feeding' (Wyndham, 2000, 34).

This initially appears to be a fruitful business. However, when most of the human population become blind due to a meteor shower, these plants seize the opportunity to turn on their human oppressors and enact a process of reverse colonisation in which humankind becomes the crop of choice and is almost annihilated. This is the severe price that the human adventurers must endure for their space exploration and 'colonial venture capitalism' (Määttä, 2020, 48). Joni Adamson and Catriona Sandilands argue that *Triffids* underscores 'the blindness and hubris of profit-driven Western extractive industries' (2019, 235). They assert that the triffids' domination of planet Earth 'is a product of greed', and that 'the wilful ignorance of triffid capacities', which is to say, the fact that they can communicate, walk, and are also carnivorous, is 'a product of precisely the blinders put in place by a narrow and instrumental focus on plant production for extraction and profit' (Adamson and Sandilands, 2019, 243). We witness this in the oldest extant manuscript of the novel, in which Bill Masen laments that 'the triffids were altogether our fault', for 'did anyone sit down to weigh the pros and cons about bringing them here? No. All that interested them was big profits quickly, and they jumped in' (quoted in Määttä, 2020, 50). Just as Lobsang in *The Long Earth* does not pause to contemplate what these giant fungi could do when introduced to the unique, complex, and delicate environs of the other worlds, or what is in the best interests of the mushrooms themselves, so too the research scientists in *Triffids* are culpable of myopia motivated by financial avarice.

The extraction of extra-terrestrial plants and the risk that such plants present is further articulated in the second book in the series, *The Long War* (2013). While the mushroom episode, with its unspoken nod to *The Day of the Triffids*, leaves readers to formulate their own conclusions about the potential risks, the encounter that Joshua has with the plant '*Sarracinea gigantica*' at the transEarth Institute in this narrative more explicitly evokes a second bout of triffid-like opportunists with a similar level of intellect, movement, and an

appetite for flesh, primed for the moment that humankind should stumble and fall (Pratchett and Baxter, 2014, 250). While Joshua awaits his appointment with Lobsang at transEarth, a stone planter attracts his attention. We read that 'the plants in it were trumpets fully five feet high, a pale green with red and white ribbing. They clustered together as though they shared a secret, and gave Joshua an uneasy feeling that it wasn't just the air currents that were making them move' (Pratchett and Baxter, 2014, 250). Hiroe, an assistant at transEarth, tells Joshua that these are '*sarracinea gigantica*', and that although they are 'carnivorous', he has no need to be perturbed, as they are 'only interested in insects. They secrete a nectar, a drugged bait, that's got interesting commercial possibilities. We got the original seeds from one of the stepwise alternates, of course' (Pratchett and Baxter, 2014, 250). The lesson in these narratives is plain—plant blindness can also imperil humankind. When we underestimate the capabilities of plants and only truly 'see' them in terms of their use value, then a voracious humankind could be faced with (and consumed by) equally voracious vegetal entities.

In addition to the removal of mushrooms and the uncannily Triffid-esque plants, *The Long War* states that the human explorers would also liberate 'samples of exotic lichen in little plastic packs, lichen taken from very *old* trees' (Pratchett and Baxter, 2014, 118). The fact that these 'unique old-tree lichens' are also taken from other worlds in order to see if they too possess a demonstrable use value for humankind likewise sounds a Wyndhamian alarm about blatant plantsploitation (Pratchett and Baxter, 2014, 118). In Wyndham's novel, *Trouble with Lichen* (1960), a rare species of lichen only native to North Manchuria that 'exists in colonies' which 'are restricted to a few square miles of territory' is found to possess a property known as 'lichenin' that extends the natural life of humankind (2008, 58). However, one of its discoverers admits that there are only sufficient amounts of the plant to continually treat 'three or four thousand people, but not many more' before it would be completely exhausted (Wyndham, 2008, 59). The demand for and implications of this plant,

coupled with its limited quantity and slow growth rate, means that, in the end, it is virtually annihilated.

In the third book in *The Long Earth* series, *The Long Mars* (2014), there is a bitter irony when Joshua notes that 'if you saw a *really* old tree, centuries or even millennia old, bent out of shape by the vicissitudes of time and coated with exotic lichen and fungi, you knew you were in someplace no farmer had ever cleared, no logger had ever plundered' (Pratchett and Baxter, 2015, 260). This sense of irony is because a cross-world harvest of each of these plant species, not to mention 'other exotic flora', has been undertaken by individuals, such as Lobsang, under the aegis of various corporations, like the transEarth Institute, since the opening up of the Long Earth to the entirety of humankind (Pratchett and Baxter, 2014, 118). The continual removal of these plants from various Earths for their known or potential commercial properties indicates that what Joshua sees here is a sight that will not and cannot be sustained, even in these infinite worlds.

1.4: What Does the Plant Say? Wounded Plants and Bloodied Earth: Plant Behaviour and the Problem of Anthropomorphism in *The Three-Body Problem* (2006) and Popular Science

The delineation of the plant sphere as no more than a landscape of unprocessed resources to be extracted for the betterment of humankind is also coupled with another manner of plant discourse that can affect the relationship between humankind and the verdant world. This is anthropomorphism—the attribution of human characteristics to the more-than-human world. In Part One of *The Three-Body Problem* (2006), we first encounter the use of anthropomorphism after the destruction of the Dahurian larch tree. The exposed cross section of the felled trunk is described as an immense 'wound' which one can caress and feel the

'pain' of the tree (Liu, 2016, 21). This idea of the maimed plant is then reiterated when it is hauled off, and we read that 'rocks and stumps in the ground broke the bark in more places, wounding the giant body further' (Liu, 2016, 22). This concept that a tree can experience pain and suffer harm to its tissue in much the same manner as humankind, is a potent instrument with which to prompt readers to relate to and empathise with the plant world. *The Hidden Life of Trees* (2015), a popular science book by Peter Wohlleben, also establishes this connection between humankind and tree-kind. Wohlleben writes that tree bark and human skin are similar both in their function, for each forms a barrier 'that protects our innermost parts from the outer world', and in their exposure to pain, so that 'a break in its bark, then, is at least as uncomfortable for a tree as a wound in our skin is for us' (2017, 61). Both *The Three-Body Problem* and *The Hidden Life of Trees* therefore blur the boundaries between human and plant life by harnessing the discourse of what we tend to consider to be an inherently animal experience.

While both *The Three-Body Problem* and *The Hidden Life of Trees* put an anthropomorphic gloss on the relationship between tree-kind and pain, this does resonate with current research on plant behaviour. The association of sentience with plant life, and in particular whether or not flora feel what humankind would constitute as pain, is a matter of much debate. The plant sphere does possess a rich repertoire of responses to particular environmental circumstances, such as those that cause harm. For instance, when certain species of flora, such as the acacia tree, are threatened due to herbivore attacks, these plants are able to launch defences. As Gen-ichiro Arimura explains, 'herbivore damage releases physical and chemical signals that stimulate defence response signalling. The local signal is further transmitted within and between plants as well as to other organisms, including herbivore enemies' (2021, 289). However, whether these reactions are purely mechanical in nature, or are attributed to some form of sentient state, has resulted in two different camps of

opinion—those who believe that flora are senseless automata, and those who consider flora to be conscious selves.

Those in the former camp, such as Andreas Draguhn, Jon M. Mallatt, and David G. Robinson, argue that 'plants lack the neural anatomy and all behaviours that would indicate pain' (2020, 239). Those in the latter camp, such as Wohlleben, argue that trees are much like humankind in their experience of pain, given that 'leaf tissue sends out electrical signals, just as human tissue does when it is hurt' (2017, 8). In this era in which there is still much to discover about plant behaviour, and most researchers underscore their agnosticism on the subject (see for instance Calvo et al, 2017, and Reber, 2018), Peter Nick writes that it is more apt at present to establish an 'in-between' position that connects these two sides of the debate (2021, 237). While Nick writes that there is 'little dispute about the fact that plants are very successful lifeforms, because they have evolved complex, flexible, and highly effective signalling', given current uncertainties, he proposes the term 'sensitive' is a more suitable label than that of 'sentient' (2021, 237).

The earth is also anthropomorphised in *The Three-Body Problem* in this encounter with the Dahurian larch tree. This is evident when we read that 'the weight of the fallen tree being dragged left a deep channel in the layers of decomposing leaves that had accumulated over the years. Water quickly filled the ditch. The rotting leaves made the water appear crimson, like blood' (Liu, 2016, 22). This quotation evokes the picture of a razor blade drawn across human skin—a cut that produces a chasm that is soon flooded with blood. In a similar vein to the razor, which is used to remove unwanted hair, the fallen tree in this scenario is emblematic of both the razor, as it is pulled in a reckless manner across the epidermis of this landscape, and of the unwanted forest, which is axed due to the indifference of humankind. This vivid visualisation of an environment that can suffer harm in a similar manner to

humankind, seeds the idea that we have more in common with the plant sphere than it would first appear—the 'just like us' principle.

The use of anthropomorphism in environmental rhetoric is, however, a powerful but Janus-faced mechanism. In this epoch of plant blindness and plantsploitation, it is crucial that we contemplate methods by which we can develop an awareness of plant life and underline the need for its conservation. Whether anthropomorphism is one potential solution, however, is a matter of serious debate. In both *The Three-Body Problem* and *The Hidden Life of Trees*, anthropomorphism is used as a potent instrument with which to redress the relationship between humankind and the plant domain, because it makes the complex world of flora relatable. This idea finds support in recent research studies (see for instance, Tam et al, 2013). The experiments undertaken in this work concluded that anthropomorphism enhances connectedness to the natural world, which in turn motivates an increase in conservation behaviour. In an era in which we are more disconnected from the environment, contact with the natural world is at an all-time low as we spend most of our time confined within four walls (see Cregan-Reid, 2019). Therefore, anthropomorphism can appear as a simple and more effective tactic with which to repair our relationship with the natural world than direct experience in nature, but this too has its pitfalls.

The concern that surrounds anthropomorphism is predicated on the fact that while it can connect one to the natural world, this literary device can also be perceived as another form of plant erasure or plant blindness. This is because anthropomorphism supplants the unique qualities that constitute the lives of flora with those of humankind. As Greta Gaard writes, 'anthropomorphizing the earth—projecting our human characteristics onto a nonhuman environment—is disrespectful in the same way that racism is disrespectful, for it seeks to understand another not on her or his own terms but as a projection of ourselves'

(1993, 305). While plants are complex, this does not mean that we should be content to dress them up in animalistic garb (the humans-in-verdant-suits approach) in order to stimulate interest in and understand their lived experience. Instead, what we need is a departure; one that will 'cross the frontiers of anthropocentrism, the limits of a language confined to human words and discourse' (Derrida, 2008, 104). When humankind slips into anthropomorphism, it demonstrates a reluctance to understand plants in their own right, or as Gaard argues, it obfuscates our potential 'to know a different other' (1993, 304). The appreciation of flora and the re-assessment of the manner in which we communicate about the plant sphere is work that it is vital to perform. The use of anthropomorphic discourse, while a proven method that can prompt humankind to relate to and empathise with the plant sphere, is, (alas), a double-edged sword that props up the rhetoric of anthropocentrism—and if we want to resist human exceptionalism, to paraphrase Donna Haraway, 'this requires resistance to the humanisation of our partners' (2008, 52).

Wohlleben has been criticised for the superabundant use of anthropomorphism in *The Hidden Life of Trees*. The furore surrounding the book led to an online petition launched in 2017, entitled 'Even in The Forest, It Is Facts We Want Instead of Fairy Tales', which aimed to appeal to the media to call the book into question. The petition argued that, while it was 'wonderful and encouraging that a mass audience can be inspired by a bestselling book about forests', this book has misled its readership about arboreal lives, which has meant that 'people obtain a very unrealistic understanding of forest ecosystems because the statements made here are a conglomerate of half-truths, biased judgements, and wishful thinking derived from very selective and unrepresentative sources of information' (2017). *The Hidden Life of Trees* has been deemed a fantastical endeavour that stretches scientific truths and oversimplifies arboreal existence in favour of quaint conjecture (see for instance Boon, 2017, and Zimmerman, 2018). While the book does refer to scientific literature on plant behaviour

in order to support its arguments, these sources are not foundational, and are instead rather thin on the forest floor—more often than not overshadowed due to the repeated interruption of anthropomorphism. For instance, Wohlleben writes that scientists at the Swiss Federal Institute for Forest, Snow, and Landscape Research recorded sounds produced by trees and found that 'vibrations occur in the trunk when the flow of water from the roots to the leaves is interrupted' (2017, 48). Wohlleben then concludes 'that these vibrations could indeed be much more than just vibrations—they could be cries of thirst. The trees might be screaming out a dire warning to their colleagues that water levels are running low' (2017, 48). This example props up mixed reviews of the book such as that of Sharon Kingsland, who writes that while Wohlleben 'makes many valid points about how ecological relationships operate in the forest, his use of the scientific literature is often a springboard to an imagined conclusion that goes beyond the scientific facts' (2018, 4).

While Wohlleben anthropomorphises the arboreal in order to communicate a substantial amount of his plant science and make the incomprehensible world of plants comprehensible, if we contemplate the intended audience of this book, (the lay public), it would appear that scientific rigour is not the intention of *The Hidden Life of Trees*. The book is less concerned with hard scientific data, and more preoccupied with how to promote public interest in the plant sphere. The representation of flora in an anthropomorphic manner is controversial, but one facet of this device found in both *The Three-Body Problem* and *The Hidden Life of Trees* is that it at least sparks a discourse; one that can in turn prompt more consideration of the plant world. If anthropomorphism can lead to a more eco-conscious readership motivated to take steps to protect and preserve the environment, then, despite its caveats and criticisms, can we still count it as an (at least in part) successful endeavour? This is the argument espoused in the work of ecocritics such as Ulrich Gebhard, Patricia Nevers, and Elfriede Billmann-Mahecha, who do not call for a moratorium on anthropomorphism.

Instead, Gebhard et al write that ‘if anthropomorphism is indeed indicative of a kind of categorical identity that permits nature to be moralized, then it might be something we should nurture rather than eliminate’ (2003, 108).

Rather than the utter dismissal of anthropomorphism, or its acceptance without question, Gebhard et al call for a more ‘“enlightened” anthropomorphism that also takes the “otherness” of nonhuman nature into account’ (2003, 93). Perhaps anthropomorphism can open the door to a conception of plant lives that connects humankind to its verdurous kin, and can be used in particular contexts for different purposes. However, it is important that these interpretations are also balanced with scientific delineations of flora that do not, to paraphrase Sherryl Vint, erase their specificity ‘in the rush to embrace similarity’, and stress that the plant sphere is remarkable without its resemblance to humankind (2014, 13). What we need, writes Jessica White, is ‘more science’, as well as ‘new expressions of that science through stories, both scientific and appropriately anthropomorphised, to convey the importance of plants’ (2019, 104).

Chapter Two

Appetite for Bio-Destruction: An Examination of the Scale and Rate of Biomass Decline in *The Three-Body Problem* and *The Long Earth* Series

2.1: Introduction

This chapter examines the scale and rate of plant biomass destruction as one of the predominant motifs in *The Three-Body Problem* (2006) and *The Long Utopia* (2015), the fourth instalment in *The Long Earth* series. In their shared discourse of an insectile humankind, both of these stories offer critiques of our appetite for arboreal destruction, so that we are left with a picture of humankind as a very hungry caterpillar—an egg that has hatched on a leaf of the world's forests and set to. And, like the protagonist of Eric Carle's children's picture book, *The Very Hungry Caterpillar* (1969), this is a caterpillar that is not satiated after it has eaten to excess for an entire week. While there is still much uncertainty surrounding the manner in which the total plant biomass of the planet is assessed, due to substandard data sources, (see for instance Bar-On et al, 2018, Pearce, 2018, Holmgren, 2017, and Harris et al, 2016), the impact of humankind on the acceleration of worldwide plant biomass destruction cannot be denied. As Yinon M. Bar-On, Rob Phillips, and Ron Milo explain, 'a worldwide census of the total number of trees, as well as a comparison of actual and potential plant biomass, has suggested that the total plant biomass (and, by proxy, the total biomass on Earth) has declined approximately twofold relative to its value before the start of human civilization' (2018, 6508). Whether directly or indirectly, plants have suffered

significant losses since the dawn of human civilisation, and these losses continue to increase dramatically, as we consume and expand ever more. To put this in plain terms, as Hope Jahren does in *Lab Girl: A Story of Trees, Science, and Love* (2016), 'we have devastated plant ecology to an extent that millions of years of natural disaster could not' (2017, 360). For we now live in a new epoch that Paul J. Crutzen and Eugene F. Stoermer call the 'Anthropocene', in which humankind is a 'main determinant of the environment of the planet' (Chakrabarty, 2009, 209).

Jahren underscores the stark decline of forest biomass, which once covered one third of the planet, when we read in *Lab Girl*, that each decade, humankind cuts down 'about one percent' of the total forested area of the planet (2017, 2). This could be perceived as an insignificant number. However, in order to provide a sense of the scale of this arboreal destruction, we discover that this 'represents a land area about the size of France' (Jahren, 2017, 2). This means that 'one France after another, for decades, has been wiped from the globe. That is more than one trillion leaves that are ripped from their source of nourishment every single day. And it seems like nobody cares. But we should care' (Jahren, 2017, 2). If the scale and rate of this decline continues unabated, then Jahren warns that 'less than six hundred years from now, every tree on the planet will have been reduced to a stump' (2017, 361). It is not just terrestrial flora, but aquatic plants too that are imperilled due to the impact of humankind on the rest of the biosphere.

For instance, in his book *Plant Theory: Biopower and Vegetable Life* (2016), Jeffrey Nealon writes that phytoplankton, microscopic plants that 'produce 40 percent of the world's oxygen (while processing similar volumes of carbon dioxide) and constitute the baseline for the food chain in the seas', are disappearing at an alarming rate (111). Their population has been reduced '40 percent since 1950 because of rising sea-surface temperatures—and once

they're gone, the oceans may quickly become dead zones of extinction' (Nealon, 2016, 111). This would have a snowball effect on the rest of the biosphere, for if the oceans become 'a toxic soup' and there is subsequently much less oxygen in the air, Nealon writes the decline of other species of flora and fauna 'won't be far behind. And if that's not a reason for even the most sceptical human to care about plants or to think about life and its protection in a more distributed way, then I don't know what is (2016, 111). In its discussion of *The Three-Body Problem* and *The Long Utopia*, this chapter demonstrates the rate this denudation of a planet can happen, as we see the swift transformation from the verdurous, to the vacant.

2.2: Farewell to the Forest: The Human Swarm of Locusts in *The Three-Body Problem* (2006)

The devastation of forest biomass in *The Three-Body Problem* (2006) commences in the second chapter, 'Silent Spring', a testament to the influence of Rachel Carson. The decline of the forest is called to our attention with the fall of an ancient Dahurian larch tree. This tree is torn down because of the 'Inner Mongolia Production and Construction Corps', a vast number of whom are dispersed amongst the forests and grasslands with the task of 'clearing fields, grazing animals, and chopping down trees' (Liu, 2016, 19-20). This soon escalates in the narrative to the extent that 'under their chainsaws, vast seas of forests turned into barren ridges and denuded hills. Under their tractors and combine harvesters, vast tracts of grassland became grain fields, then deserts' (Liu, 2016, 20). While this tale does not address pesticides at this particular juncture, it does confront a comparable force that causes fatal harm to much of the plant life it touches—one that also makes its presence known when (x) number of healthy species are condemned to die as a result of its actions. In a similar manner to the way in which the seminal *Silent Spring* (1962) exposed the destruction of both wildlife and human life due to the widespread use of pesticides, so *The Three-Body Problem* exposes the

destruction of biomass due to the widespread activities and pervasive indifference of humankind. Just as Carson writes that 'chemicals have been created for use in killing insects, weeds, rodents, and other organisms described in the modern vernacular as "pests"', in 'man's war against nature', so humankind is purposefully blanketed on the forestscape in this tale in order to cause its annihilation, because it too is deemed unwanted (2000, 24).

Ye Wenjie describes this wanton destruction of plant life as 'madness', and compares her comrades to a swarm of insects in their indiscriminate devastation of tree species from across the world (Liu, 2016, 20). We read that 'the tall Dahurian larch, the ever-green Scots pine, the slim and straight white birch, the cloud-piercing Korean aspen, the aromatic Siberian fir, along with black birch, oak, mountain elm, *Chosenia arbutifolia*—whatever they laid eyes on, they cut down. Her company wielded hundreds of chainsaws like a swarm of steel locusts, and after they passed, only stumps were left' (Liu, 2016, 20). The intricacies of the forest are paid no attention, and an invisible red cross mark looms over all. The use of a list in this quotation in order to describe the various trees that dwell within this forest, is a potent technique that conveys what Rob Nixon defines as a 'sensory density' (2011, 64). It underlines that the woodland is not a verdurous mass, but a diverse world of individuals. The reader is prompted to envision the way in which this particular forest would look, sound, and smell—to form a connection with this environment that creates a sensation of being there, as it is wiped out of existence.

While the comparison of humankind to insects evokes visualisations of the biblical plague of locusts found in the book of Exodus, there is one marked difference between the two. Whereas the Bible establishes humankind in opposition to the insects which have been sent by an external source, God, in order to decimate the environment in their devourment of all of the plants that grow in the fields, here, as a result of its zoomorphism, the distinction

between humankind and insect ceases to exist. Rather than coming from without to terrorise the landscape, there is a sense that the locusts, and their concomitant compulsions to consume and lay waste, have been hatched internally, that the human species are the incubators, vessels, and perpetrators of a plague unto themselves, and one which has dire consequences for the rest of the planet. This resonates with what Carson writes in *Silent Spring* about humankind and the use of pesticides in her succinct 'Fable for Tomorrow'—namely, 'no witchcraft, no enemy action had silenced the rebirth of new life in this stricken world. The people had done it themselves' (2000, 2).

The deforestation delineated in Chapter Two has still not concluded later on in the narrative. Ye Wenjie must watch on, as she recounts in Chapter Twenty-Three, eight years after her arrival to work in the forest, as it 'continued to fall to the deranged logging by her former comrades. Patches of bare earth grew daily, as though those parts of the Greater Khingan Mountains had had their skin torn off' (Liu, 2016, 293). This depiction of the landscape as a tortured space ripped apart due to extreme exploitation recalls definitions of such human perpetrators across the world as insatiable resource 'omnivores', or what John Gray terms '*Homo rapiens*' (Guha, 2006, 233; 2002, 151). The insectile humans appear once more in the narrative in Chapter Twenty-Seven, in which we read that 'the logging was in full swing. In every direction, trees were falling. The entire forest seemed like a mulberry leaf being devoured by silkworms on all sides. At the current rate, it would disappear soon' (Liu, 2016, 337). These scenes of a voracious insect-like humankind that makes short work of the forestscape read as a demonstration Peter Barry's assertion that 'nature is rapidly being gobbled up by culture' (2009, 254). We can view these elements of *The Three-Body Problem* as a sort of modern, science fictional retelling of 'Hansel and Gretel', one in which the children, or, in this case, the Production and Construction Corps workers, can be interpreted 'as representatives of humanity' that have mutated into insects, and the witch and her forest

abode, (the fields and forests of China), become an allegory for the biosphere (Parker, 2020, 169).

2.3: Insectoid Invaders and Insectoid Inversion: From Humankind as Insectile in *The Three-Body Problem*, to the Representation of Beetles as Humankind in *The Long Utopia* (2015)

In *The Long Utopia* (2015), the fourth instalment in *The Long Earth* series, Terry Pratchett and Stephen Baxter also partake in this theme of humankind as voracious insects that set upon the plant biomass of the planet. This is best illustrated in Chapter Sixteen, in which, prior to when the infinite worlds one step east or west are made accessible to all, Oswald Hackett compares the urban crowds of the Datum Earth, birthplace of humankind, to a 'swarm', and likens London to 'one great decaying tree trunk through which the maggots and the weevils chew their way, selling bits of bark to each other for farthings' (Pratchett and Baxter, 2016, 138). This concept of humankind as dismantlers of the planet on which the survival of both we, and the more-than-human world, depends, recalls Elizabeth Parker's observation that it is 'a fitting pun that the modern human is often described in terms of the *consumer*' (2020, 54). However, *The Long Utopia* takes this discourse of human consumption of plant biomass a step further, in its introduction of a voracious, ironically insect, species as a force that rivals and mimics what Shoshanna Ganz terms the 'monstrous greed' of humankind (2013, 88).

Commensurate with what Jonathan Bate calls our 'insatiable desire to consume the products of the Earth', *The Long Utopia* offers up a polemic against the world that we have made, or rather, unmade, due to our 'capitalist transformation of the world into raw materials and the expansion of humans to the detriment of all other life on the planet' (1991, 56; Vint,

2014, 50). Pratchett and Baxter foreground the problem of human biomass consumption via a shift in perspective, implemented through a lens with an element of distance—in an elsewhere place that is like Earth but is not, and with an alternate species that resembles humankind but is not. The use of the insect as social commentary in this tale presents an abject realisation for both the human characters and readers, as the monstrosity of insatiable biomass consumption is performed through the figure of the insect-other. This distorted and hyper-accelerated alien parody of human biomass consumption should prompt readers to confront and redress our interactions with and relationship to the more-than-human world, lest we do in fact metamorphose into the insatiable insects that are the subject of our science fictional comparisons.

The plot of *The Long Utopia* transpires as follows: a bunch of would-be human colonisers from the Datum settle on the forested world of 'Earth West 1,217,756' (Pratchett and Baxter, 2016, 10). The pioneers start to relandscape in order to tailor this planet to their needs. In addition to their introduction of non-native species from the Datum for their use, such as 'chickens and goats and pigs and even sheep', we read that these new human inhabitants have also 'opened up the forest in order to build their little town', a process that leaves in its wake a series of 'neatly cut and burned-out stumps where great old trees had been removed', and architectural anomalies such as 'a little chapel, half-finished, with a truncated steeple open to the elements' imposed on this world as the legacy of human occupation (Pratchett and Baxter, 2016, 35, 32). However, another species has also laid claim to this planet—one that has set about the manipulation of this world below the earth in order to make it suitable for their own purposes. Our first encounter with these creatures occurs when one of the human founders, Cassie Poulson, in her efforts to build a cellar next to her house, pushes her shovel through one of its walls and into a subterranean chamber, in which a face looks out at her; a face that 'was human-sized, but not human. More insectile, she

thought, a kind of sculpture of shining black, with a multiple eye like a cluster of grapes. And half of it was coated with a silvery metal, a mask' (Pratchett and Baxter, 2016, 12).

Cassie puts planks over the cellar and conceals its insect inhabitant from the world and from mind, and the town is eventually abandoned, not due to this brush with the insect, which remains a secret, but because the second generation of human residents transition to a nomadic existence with cross-world abodes that shift with the seasons. Yet, the town still remains a social hub and resource cache, in which 'the Poulson place was used as the local swap house' (Pratchett and Baxter, 2016, 31). In April 2052, sixteen years after the first contact between Cassie and the insect, Nikos Irwin, sent on an errand to the Poulson house in search of shoes, unearths the cellar and ventures inside the breach in the wall and down a tunnel after his dog Rio falls in due to the now rotten planks of wood. The tunnel opens out into an expansive chamber that has been meticulously mined. Its appearance leads him to recall that 'there was a seam of iron ore around here that the founders had plundered when the Poulsons had built their forge', and that this 'rich seam, unique to this particular world, was one reason they'd settled here' (Pratchett and Baxter, 2016, 44). However, he concludes that the founders 'could never have dug all *this* out in such a short time, and there would have been no need to anyhow' (Pratchett and Baxter, 2016, 44). As Nikos ponders who such miners could be that have excavated the earth of this place more than humankind, like Cassie he too encounters one of the subterranean insect residents.

As a result of its face of two parts, half 'covered by silvery metal, the other even worse, sculpted out of what looked like the black shiny stuff God made beetles out of', Nikos christens this creature the 'silver-beetle' (Pratchett and Baxter, 2016, 44-45). The narrative details that the creature 'looked human-sized, but like a beetle or a locust in its shape and the way it moved and in the shiny black hardness of its body, its multiple limbs. And he saw, *he*

heard, more beetle creatures approach' (Pratchett and Baxter, 2016, 45). In his panicked attempt to flee from this tide of creatures that evoke in him 'fear and disgust', Nikos steps into another world that is evidently not an Earth, because the sky of this world is 'orange-brown, not blue, and there was no sun or moon' (Pratchett and Baxter, 2016, 47). However, his visit to and impressions of this world are cut short, as one of the beetles notices him, and returns him, safe and sound, to his home world. This encounter indicates that, in a similar vein to humankind, the beetles have likewise set out from another world and into the Long Earth for their own expansionist purposes. While we are led to presume that that this must be the Datum world of the insects due to its vast population, for there are 'hundreds of them in great crowds, rustling, scraping', the team of human scientists sent to research this planet later on in the tale conclude that the insects are not native to this place either (Pratchett and Baxter, 2016, 4).

This results in questions about what their purpose is, both here, and in the human occupied stepwise world. In the former planet that is devoid of humankind, the scientists notice that the landscape is covered in 'sacs of air', whose gaseous contents 'match the contents of the bags you see attached to individual beetles' (Pratchett and Baxter, 2016, 341). Dr Bowring reveals that these bubbles of air 'all contain a subtly different suite of gases from the local atmosphere', a discovery that leads the researchers to deduce that 'the bugs are manufacturing a different atmosphere. They aren't native to this world. They're terraforming it' (Pratchett and Baxter, 2016, 341). However, Dr Bowing notes that this is a misnomer, as the beetles are 'not making it like the Earth, as we would', but instead are 'delivering conditions that suit them, presumably' (Pratchett and Baxter, 2016, 341). He proffers the term '*xenoforming*' instead, as he considers that the insects 'came to this world to make it like their own' (Pratchett and Baxter, 2016, 341). The scientists speculate that the beetles are 'interstellar travellers', as the stars in the sky of this sepia world reveal 'a grand, expanding

wave of them' (Pratchett and Baxter, 2016, 342). Their treatment of Earth West 1,217,756 is somehow different, however, with none of the 'replacement of the air and whatnot' that are plain here (Pratchett and Baxter, 2016, 343).

This difference in approach can be traced to the periphery of the colonisation wavefront, in which the scientists spy a series of 'irregularly shaped' objects that are not 'the usual cosmic furniture, the planets and the asteroids of a virgin system, nor the green that characterises the beetles' colonisation push' (Pratchett and Baxter, 2016, 343). Dr Bowring speculates that 'there, at least, somebody is fighting back, against the beetles' expansion', and that this conflict visible in the sky 'may be why we find so much activity by the beetles just now' in the human inhabited world, due to the fact that '*they encountered us*' (Pratchett and Baxter, 2016, 343). The beetles are evidently intelligent entities that 'have learned to anticipate resistance', and, as such, Dr Bowring points out that they have clearly 'accelerated whatever programme of work they had, in order to get it done before we have a chance to fight back, to stop them' (Pratchett and Baxter, 2016, 343). The calculated actions of the insects in *The Long Utopia,* and their apparent ambition to expand in a similar manner to a 'dandelion' or a 'puffball fungus' and colonise the cosmos for their own purposes, challenges the imperialist hegemony of humankind, and serves 'as an emblem for their techniques' (Pratchett and Baxter, 2016, 419; Vint, 2014, 1).

As with the insects found in H. G. Wells' short story, 'The Empire of the Ants' (1905) discussed in Sherryl Vint's book, *Animal Alterity: Science Fiction and the Question of the Animal* (2010), the beetles in this narrative also dispute 'the human-animal boundary by their displays of intelligence' (2014, 121). The examination of the ants undertaken by Vint illustrates that their behaviour in many ways reflects that of the silver beetles in this contemporary human-insect narrative commentary. In both narratives, these creatures 'are not

simply unthinking, instinctual hordes that overrun the rational order established by the colonial power', but are also adversaries that demonstrate 'a capacity to plan' to rival that of humankind (Vint, 2014, 122). The most uncomfortable aspect of insect intelligence that can be mapped on to both of these narratives, however, is that the ants and silver beetles alike 'use it to enact precisely the same sort of expansionist aggression that characterises colonial nations'—that is to say, the race to 'colonise all the empty space, as widely as possible, as fast as possible, before anybody else gets a chance' (Vint, 2014, 122; Pratchett and Baxter, 2016, 419). We can thus extrapolate that *The Long Utopia* and 'The Empire of the Ants' both use the horror evoked by the insect-other in order to accentuate 'the horror of colonialist and capitalist expansion' and the concurrent indifference of humankind with regard to the consequences of such conquests on the rest of the biosphere (Vint, 2014).

2.4: When Bugs Attack: *The Long Utopia* (2015) and the Insect Predation of an Entire Planet

Joshua and Lobsang embark on an aerial expedition across Earth West 1,217,756 in an attempt to discover the intentions of the beetles, and whether or not their appearance and subterranean industriousness are linked with the weird events that this world has recently experienced. These abnormalities have included adverse weather conditions in a place that was invariably 'clement', and days that are 'too short' and 'getting shorter' (Pratchett and Baxter, 2016, 95, 107). What they find is that the insects have re-engineered the planet on an impressive global scale, with a series of steel viaducts that girdle the Earth—structures whose purpose is to spin up this world by transforming it into a vast 'electrical motor' (Pratchett and Baxter, 2016, 262). In order to acquire sufficient materials for this enterprise, Lobsang tells Joshua that 'the beetles must already be consuming the resources of this world at a prodigious rate. Somewhere there must be mines the size of small nations', and that 'this is a predation

far worse than humanity ever inflicted on the resources of the Datum' (Pratchett and Baxter, 2016, 249). While he admits that it is 'illogical' to feel ownership or to be territorial, for, in his words, 'in what sense does this world *belong* to humanity?', both he and Joshua nevertheless conclude that 'this Earth is more ours than theirs' (Pratchett and Baxter, 2016, 249).

This spin up of the planet that the beetles are absorbed in has serious ramifications for the rest of the biosphere. In addition to upsets to human life, predominantly in the form of sleep deprivation, the animals too experience distress, as their routines become out of synch with this world and it becomes less comfortable for them to inhabit. Whereas before, the creatures of this world known as 'furballs' would appear in the forest at dawn 'to hunt the insects' and fall victim to the nets of humankind, and birds taller than humans would in turn 'come out to hunt the furballs', the shorter days that ensue due to this spin up disrupt this routine and chaos subsequently results in the forest (Pratchett and Baxter, 2016, 106). We read that not only would the furballs 'emerge from their burrows and their holes in the trees at the wrong time', but 'sometimes the big birds would charge around the forest almost randomly, screeching like eagles' (Pratchett and Baxter, 2016, 190). In their fabrication of this planet as a resource for their own growth as a species, the beetles have totally disregarded the biosphere within, and unravelled the natural laws that govern it.

The weather is also affected due to the operations of the beetles and becomes much more extreme. Due to the curvature of the Earth, wind and water curve too as they travel across its surface, in what is known as the Coriolis effect. The faster the Earth spins, the more the winds and water curve, and the more energy they carry with them. This leads to major environmental disasters on this world. We read that 'there were more and more freak events: storms, droughts, howling winds – and, strangest of all, bizarre "magnetic storms"' in which

‘auroras would flap in the sky like tremendous curtains, streaming north to south’ (Pratchett and Baxter, 2016, 234). These storms also impact the local wildlife of this planet, as many of the creatures ‘like navigating birds, relied on a stable magnetic field for their sense of direction’ and so now ‘blundered about even more randomly than before’ (Pratchett and Baxter, 2016, 234). The plant life also suffers due to the actions of the insects in this altered weather-beaten world. As the airship makes its way across this world, we read that ‘Joshua saw swathes of trees laid out flat, their great trunks lying parallel on the ground, as if combed. Elsewhere there were huge blackened scars, the relics of fires presumably sparked by lightning’ (Pratchett and Baxter, 2016, 244).

When the airship reaches the coast, what Joshua presumes to be ‘driftwood’, turns out to be ‘whole trunks, complete root systems: thousands of mature trees uprooted as a child would pluck daisies, and flung down in rows’, ‘hundred-year-old trunks’ that ‘lay scattered like spilled matchsticks’ (Pratchett and Baxter, 2016, 245, 412). The harm inflicted by ‘freak waves’ also reveals ‘the wave-smashed ruin of a coral reef’ (Pratchett and Baxter, 2016, 251). When the team of scientists later undertake a series of surveys, they find that ‘the planet looked like a cracked vase’, due to fractures that are ‘tectonic flaws, bands of volcanoes and quakes’ (Pratchett and Baxter, 2016, 328). In addition, ‘the extreme winds had thrown water vapour high into the stratosphere and broken down the ozone layer’, and the air becomes suffused with the ‘smell of death, of ash and sulphur and rot and the smoke of burned forests’ (Pratchett and Baxter, 2016, 365, 367). All of these large-scale eco-catastrophes are side-effects of the beetles’ activities on this planet. Their actions cause ‘a significant die-back’ before this world breaks apart entirely (Pratchett and Baxter, 2016, 322). The chief science officer, Margarita Jha, who has been sent to this world to research the beetles, explains to the human inhabitants that ‘it’s not just your lives that have been disrupted. We’re talking about a

peculiar kind of extinction event on this world. And it's your great misfortune that your township has been caught up in it' (Pratchett and Baxter, 2016, 321-322).

The purposeful work of the insect-other in this tale in such a short space of time, and its ramifications for the rest of the biosphere, can be interpreted as an allegory for humankind and its implication in the sixth mass extinction event in our planet's 4.5-billion-year history. This has been set in motion due to what Anthony D. Barnosky and their associates call a 'perfect storm' of human-induced 'multiple, atypical high-intensity ecological stressors' that include 'co-opting resources, fragmenting habitats, introducing non-native species, spreading pathogens, killing species directly, and changing global climate' (2011, 56, 51). Gerardo Ceballos and Paul R. Ehrlich write that 'the rate of species extinction is now as much as 100 times that of the "normal rate" throughout geological time' and argue that 'like the past mass extinctions, the current episode is not an inevitable consequence of the process of evolution. Rather, it is the result of a rare event changing the environment so quickly that many organisms cannot evolve in response to it' (2018, 1080). The lesson here for characters and readers alike is that, in order to avoid such immense losses of biota, we must put away our mandibles and act ethically towards the more-than-human world. If we should fail, we risk following the trajectory of the silver beetles, as they set out to create their mono-species cosmic empire.

In consideration of their next steps, as the occupants of the airship look on the works of the beetles and despair, Lobsang observes that they have 'come under no threat. The beetles must be aware of our movements; we passed over a work party, remember, on the New York viaduct. We are evidently irrelevant to them' (Pratchett and Baxter, 2016, 259). This notion that the beetles are as indifferent to human actions as human beings are with respect to the more-than-human world is a marked inversion, and one that percolates

throughout this human-insect encounter. We see this a little later on in the narrative when some of the scientists attempt to communicate with the beetles via the 'universal language' of 'mathematics', and strive 'to get them to recognise prime numbers in symbols, heaps of stones' (Pratchett and Baxter, 2016, 334-335). However, they find the insects 'just walk away' (Pratchett and Baxter, 2016, 335). The fact that the purposeful activities of the humans are ignored by the beetles, signals that much like the Martian invaders in H. G. Wells' *The War of the Worlds* (1898), they do not perceive humankind as sentient any more than humankind would normally recognise a beetle as such. The refusal of the beetles to take heed of the endeavours of humans to speak with them, and their attempts, when this fails, to annihilate them and their viaducts, equates to a violation of 'a presumed "natural" hierarchy in which humankind is meant to have dominion over all animals' (Vint, 2014, 12).

Instead, humankind is diminished from active subjects to passive objects, peripheral spectators to 'bugs doing their bug stuff and leaving us alone' (Pratchett and Baxter, 2016, 338). This metamorphosis of the human into an object below the notice of the insects is not only a reduction 'that has been typical of human social relations with animals', and of course, plants, but also means that the plight and eventual demise of 'their' world due to the actions of the beetles 'makes no ethical claim' on them (Vint, 2014, 70, 30). While the insects are content to play with the human children, something that the adults misconstrue as 'a chink of hope we might somehow get through to them', for 'if they can be playful' then surely they are 'not evil', what we see here once more holds a mirror up to our own behaviour as a collective species (Pratchett and Baxter, 2016, 334). To call the beetles wicked is a misnomer. In short, they are simply as unconcerned about the consequences of their actions on the planet as humankind is when the more-than-human world is threatened by our own consumption habits. The beetles, much like humankind, put beetle interests first, and whether or not those interests affect the rest of the biosphere is a non-issue, collateral damage, for the

great beetle plan for the universe trumps all else. The insects, as shown by their apathy, evidently do not perceive human adults as a threat, or think much of them at all, but they appear to treat the human children as a sort of Haraway-ian 'companion species' (2016, 94). Perhaps this is a question of scale, and they feel a kinship with these small creatures that are also scrutinised and prompted to perform in a certain manner by their adult human counterparts.

After Lobsang uses his mass spectrometer in order to examine some of the discarded silver beetle parts that he finds in the cavern, he determines that while the insects are extra-terrestrial in origin, 'now that they're here they appear to be making more copies of themselves – breeding, you might call it – using local materials. Stuff from Earth, this Earth' (Pratchett and Baxter, 2016, 236-237). These routine actions of the silver beetles, which is to say, their widespread proliferation across this world via the consumption of its resources, in much the same manner as humankind in the narrative have mushroomed across the Datum and the Long Earth, are perceived as disrespectful by Agnes, whose response to this news is to declare 'what a cheek. This is our world, not theirs' (Pratchett and Baxter, 2016, 237). This discourse of the silver beetles as an alien species that has invaded a space that has been earmarked for human habitation, mirrors the contemporary real world, in which Vint points out that 'invasion metaphors are regularly used to describe the spread of species from areas where human culture designates them as "indigenous" to areas where they are designated as foreigners taking over' (2014, 24). In the prior quotation, what we see is a disdain for creatures that do not, as far as the human occupants of this world are concerned, know their place in the natural hierarchy—a desire that the silver beetles should have remained unseen on this planet under rocks and soil—should they have the audacity to be here at all. Never mind a cat among the pigeons, the silver beetles are castigated in their position as ants among the picnic—bothersome insects that dare to eat at the table that is reserved for humankind.

The human inhabitants also exhibit an abhorrence about the way the beetles use the materials of this planet, as evidenced when Dr Bowring observes the routine actions of the insects and spits 'look at them swarming everywhere. They take the stuff of this world, and are making it into copies of themselves. How disgusting, what *greed*' (Pratchett and Baxter, 2016, 341). The beetles' deconstruction of this world to make more insects is also described by Stan Berg as a 'waste' (Pratchett and Baxter, 2016, 419). However, as Lobsang tells Stan, what the human residents discern as wanton destruction of 'their' planet, the silver beetles perceive as significant steps towards their advancement— 'the beetles wouldn't say that', for '*they* believe they're improving the neighbourhood' (Pratchett and Baxter, 2016, 419). The irony is, of course, that the silver beetles are merely mimicking the actions of humankind, but at a hyper-accelerated rate. The characters are thus not in a position to condemn the consumption habits of the beetles. As Lobsang admits, 'the European explorers imported their own farm animals, their vermin, even their songbirds to the Americas, to Australasia', and 'what have Europeans done save convert a significant fraction of those continents' biomass into hundreds of millions of copies of themselves? Just like the beetles. If by a rather low-tech method' (Pratchett and Baxter, 2016, 341-342).

As the situation on Earth West 1,217,756 worsens due to the activities of the beetles, the vitriol Agnes directs towards them intensifies, and she explodes 'who are these beetles, these bugs, to fall on a world and consume it for their own purposes – everything it was, everything it could have been, gone in a flash, just to fuel another minute stage of their own endless expansion?' (Pratchett and Baxter, 2016, 348). This is met with the response from Lobsang that Agnes would 'have a point if it wasn't for the fact that that's what humanity has always done' (Pratchett and Baxter, 2016, 348). In a similar vein to humankind and its arrival into the Long Earth, Lobsang notes that 'by coming stepwise to this Earth, the beetles suddenly found themselves in an empty world – empty of their competitors at any rate – and

under an open, empty sky' (Pratchett and Baxter, 2016, 419). The insects also adopt the same approach, but to the extreme, as that undertaken by humankind once it gained access to this new chain of worlds. That is, 'to colonise all the empty space, as widely as possible, as fast as possible, before anybody else gets a chance. And that means sending seeds off in all directions, as many as you can' (Pratchett and Baxter, 2016, 419). When Stan asks the others 'what kind of being would *do* this?', he receives a curt response; 'creatures like humans' (Pratchett and Baxter, 2016, 420). While Agnes acknowledges these truths, she still complains 'but now *we're* in the path of the juggernaut' (Pratchett and Baxter, 2016, 348). For Agnes, the silver beetles must be condemned because in this hierarchical reversal, in which the human metamorphoses into the panicked spider trapped under the glass, its chance of preservation doubtful, it is human lives and human abodes that are at stake as the beetles process this world into more copies of themselves. We are led to believe it would be a non-issue otherwise, it appears, as it has been since the dawn of human civilisation—an episode of anthropocentrism at its finest.

In view of our track record of the maltreatment of other species, it is a predictable response that the human inhabitants of this world take in order to deal with their insect problem. Their first reaction is an attempt to exterminate them. However, this does not pan out as expected, since the silver beetles 'are cyborgs, a fusion of life and machine' (Pratchett and Baxter, 2016, 380). This is a realisation Dr Bowring experiences first-hand, as he tells the others 'shoot a gun at one of the damn things and the round just bounces off its hide. Or it absorbs the slug and becomes that bit stronger' (Pratchett and Baxter, 2016, 379). Margarita Jha in turn explains that 'when we failed to make a dent in the bugs themselves, we tried attacking their works. These viaducts. We tried a whole series of demolition tactics' (Pratchett and Baxter, 2016, 380). While the weapon they deploy cuts one of the viaducts, Dr Bowring notes that 'within forty-eight hours the damn beetles had built the thing back again',

and that ‘the incident made no difference to the spin-up process’ (Pratchett and Baxter, 2016, 380). He ponders that perhaps ‘with some kind of concerted effort we could disrupt them, slow them down. But at what cost? This Earth turned into a nuclear wasteland, on top of its other problems? And we couldn’t eliminate all the beetles anyhow’ (Pratchett and Baxter, 2016, 380). Since Jha explains that the beetles have ‘simply ignored everything we’ve tried to do to them, just as they ignored every contact we attempted’, the humans reach a consensus that ‘we have to give up this world. We can’t destroy the beetles. But we *must* protect the rest of the Long Earth from these creatures’ (Pratchett and Baxter, 381).

Given that this world is now written off as lost, and must be relinquished, humankind concocts a scheme with which to ‘stop the beetles spreading further, from threatening more of the worlds of mankind’ (Pratchett and Baxter, 2016, 349). This entails a plan to close the world from the inside, in order to make it ‘impossible to step into, or out of’, and so contain the beetles (Pratchett and Baxter, 2016, 381). We read that their realisation that ‘the goal of the beetles was not the transformation of this world into some new form, but its destruction’, meant that the question of ‘whether to go ahead with the operation the military people had come to call the Cauterizing’, was ‘an easy one to make’ (Pratchett and Baxter, 2016, 403). This drastic measure taken in order to ensure that the insects do not obtain ‘terrestrial sovereignty’ over the rest of the infinite worlds of the Long Earth is wholly unfair—but not as extreme as the measures taken in the war between insects and humankind found in ‘The Miracle of the Lily’ (1928), by Clare Winger Harris (49). In this short story, we see that, rather than share ‘their’ world with the insects, humankind instead decides to use ‘man-made fires’ to bring ‘devastation to every living bit of greenery, so that in all the world there was no food for the insect pests’ (Harris, 1928, 49). These pests subsequently succumb to raids on laboratories for food, and the consumption of humans and each other—before eventually starving to death—with humankind left to assert its ‘dominion’ over a dead world.

While some of the human characters in *The Long Utopia* see themselves in the beetles and their actions, as evidenced when they admit that 'they are disturbingly like us', this does not, unfortunately, translate into an ownership of responsibility for their repeated acts of biomass exploitation across multiple worlds, nor does it prompt them to cease-and-desist (Pratchett and Baxter, 2016, 342). Instead, the human inhabitants of this world and beyond condemn the beetles for their self-same fault, all the while refusing to confront and redress their own problematic and edacious relationship with each biosphere that they make untrammelled use of throughout the Long Earth. This final act reads as a world-sized equivalent of a human who traps an insect under a container and continues about their day, nonplussed. The crisis of an insect 'takeover' has been averted, and the beetle 'menace' quashed. We witness a similar reaction in 'The Miracle of the Lily', in which humans capture the 'last living insect', who is also a beetle, the 'stag-beetle (*Lucanus*)', and hold him 'in captivity', much like his Long Earth counterparts, who are contained within this one world in the Long Earth chain for evermore (Harris, 1928, 51).

Both of these scenarios are emblematic of a kind of smugness, as these confined spaces become relics of 'a type of life that might have covered the face of the earth, but for man's ingenuity' (Harris, 1928, 51). The solution enacted in *The Long Utopia* valorises the preservation of human interests in the Long Earth, with no consideration of the ways in which those interests affect the preservation of the more-than-human worlds. To seal up the one 'human' world in the chain that the silver beetles did devour, is to 'save' the rest of the pearls in that necklace for humans to destroy in their own time and for their own purposes, no questions asked, contrary to their scrutiny of the beetles, as order has once more been restored to humankind. *The Long Utopia* thus concludes on a pessimistic note, as the hope that the humans encounter with the insects would transform their approach to these delicate and complex worlds, dies adjacent to this particular Earth, as the insects begin their 'cynical

harvest' (Pratchett and Baxter, 2016, 432). We can therefore conclude that *The Three-Body Problem* and *The Long Utopia* demonstrate to readers that we have met the voracious insect—and, alas, it is us.

Chapter Three

The Trials and Tribulations of Plant, Animal, and Human(oid) Subjects: Intersectional Oppressions and Exploited Bodies in *The Three-Body Problem* and *The Long Earth* Series

3.1: Introduction

In the natural world, to paraphrase Rachel Carson in her seminal book *Silent Spring* (1962), there is nothing that exists alone (2000, 60). Both *The Three-Body Problem* and *The Long Earth* series underscore that this includes the modi operandi and structures of exploitation and consumption that exist across and between species. While *The Three-Body Problem* addresses the intersection of multiple forms of oppression that exist across species, sex, and class, *The Long Earth* series is concerned with the maltreatment of other-world humanoids known as trolls. The first part of this chapter focuses on the interrelationship between the violence exacted on women, animals, and plants in *The Three-Body Problem*. The second part then looks at processes of species exclusion and exploitation at the hands of humankind. This addresses the problems that arise when an ethic-of-care towards the more-than-human world is not extended to humankind in *The Three-Body Problem*, and is followed up with a treatment of the trolls and their misuse in scientific experimentation, forced labour, and consumption in the second instalment in *The Long Earth* series, *The Long War* (2013). This chapter demonstrates that all entities on this planet deserve moral consideration, that it is not a check-box reserved for a selection of humankind. In its examination of the construction of women as meat, trees as timber, and poor people as beneath concern in *The Three-Body Problem*, as well as trolls as no more than units of forced labour in *The Long War*, it asks us

to reconceptualise our relationship with the rest of the biosphere, as mere 'stuff' to serve the needs of others, and underlines that violence and abuse toward the rest of our kin with whom we share the planet, whether human or otherwise, must be stopped.

3.2: 'Ever on the Menu and Never at the Table': The Butchered Biosphere and the Shared Violence of Women, Farmed Animals, and Trees in *The Three-Body Problem* (2006)

The first chapter of *The Three-Body Problem* underscores the fact that the bodies of plant, animal, and human subjects, (the latter of whom are predominantly women), intertwine and suffer the same fate, in their metamorphosis from alive and purposeful individual entities, into a conglomeration of dead objects. The violence exacted on humankind and the other-than-human world in the narrative manifests in both discursive and material forms. In chapter one, we read that the Red Guards are dehumanised and described as 'wolves' (Liu, 2016, 4). This is a linguistic sleight of hand that not only evidences the ease with which this distortion of plant, animal, and human subjects can occur, but also transforms the human into that which it is deemed 'acceptable' to kill, for the wolf has long been represented as an eater of Grandmothers, destroyer of porcine houses, and all-round hostile creature in both Western and Chinese cultures. As He Chengzhou argues, 'the Chinese have a deep-rooted complex of "hating wolf"', for 'the wolf has been traditionally regarded as the enemy of man and defined as a ferocious and greedy species' (2009, 399). If wolves are perceived as foes with a malevolent manner, writes He, then their murder 'seems to be justified' (2009, 408).

When Ye Wenxue, a member of this so-called 'pack of wolves', exits her 'headquarters' (or rather, if we wish to sustain the metaphor, her den), in order to demonstrate her prowess before another Red Guard faction (or rather, a rival pack), this juvenile she-wolf

transitions from alive subject to dead meat. We read that 'the slender figure of a beautiful young girl emerged at the top of the building, waving the giant red banner of the April Twenty-eighth Brigade. Her appearance was greeted immediately by a cacophony of gunshots' (Liu, 2016, 4). When her body slowly descends from her post, she is once more associated with her animal kin as 'a little bird' reluctant to depart from the sky, while in her final impaled form, her corpse becomes one with the world of flora, with 'vinelike arms' that quiver in a storm of bullets, like the flicker of leaves in the rain (Liu, 2016, 4).

When the human female subject becomes reconstituted as wolf, bird, and plant subjects, before her final form as an 'it', the fall from personhood to flesh object, Ye Wenxue becomes othered threefold due to her sex, animalisation, and floralisation (Liu, 2016, 5). The shift between these different species in this encounter is of particular importance, because it connotes their fate in this world as one and the same. As Greta Gaard writes in *Ecofeminism: Women, Animals, Nature* (1993), both women and the more-than-human world share in a 'common oppression' (7). The narrative provides readers with potent and vivid intersections between the violence systematically directed against women, and the concomitant despoilation of the environment and annihilation of animals for the food market and other commodities. The emphasis that *The Three-Body Problem* places on Ye Wenxue's appearance as a 'beautiful young girl' with a 'slender figure', whose 'fifteen-year-old body was so soft', underscores that female bodies are similarly constructed in a patriarchal culture as environments whose features it is deemed acceptable to map, exploit, and consume (Liu, 2016, 4-5). Prior to her final realised form as butchered pieces of flesh, Ye Wenxue must first be transmuted from an alive individual human subject into a lifeless body, a 'trophy' that is phallically impaled on the 'sharp tipped metal bars' of the compound (Liu, 2016, 5). The use of the word 'trophy' is significant here, as it underscores the inherently problematic ways in which language fuses the inferior status of women and animals in a patriarchal culture (see

Adams, 2021, 52). This issue is further emphasised in *Swallowing Clouds: A Playful Journey Through Chinese Culture, Language, And Cuisine* (1990), in which Anthony Zee states that the Chinese 'character for "meat" (or "flesh" in general)' is also used in the derogatory description of an attractive woman (2002, 88). The term 'trophy' reinforces the notion of her body as doubly 'fair game', in that the pursuit of the beautiful woman is assimilated with the hunt for the wild animal within patriarchal culture, in which, due to their cultural construction as lesser entities, both are considered to be appropriate prey candidates.

The description of Ye Wenxue's violent death, in addition to the barbarism of what is done to her corpse after her death, can be interpreted as an indictment of what happens to the bodies of our animal kin from farm to plate. In a similar manner to the short lives of animals raised for meat, Ye Wenxue is also not permitted to reach adulthood and grow old, murdered at a fraction of her natural life. The choice of words used to depict her death is of particular significance, for we read that that it is not humans *per se* that result in her demise, but rather, their 'weapons' (Liu, 2016, 4). This concept that it is instruments rather than people that attack and kill and butcher resonates with the philosophy of Hannah Arendt in her book *On Violence* (1969). Arendt argues that violence inflicted by humankind 'always needs *implements*', which she writes, 'like all other tools, are designed and used for the purpose of multiplying natural strength until, in the last stage of their development, they can substitute for it' (1970, 4, 46). In *The Sexual Politics of Meat: A Feminist-Vegetarian Critical Theory* (1990), Carol J. Adams lists some of the implements of violence required for humankind to undertake animal butchery, which include 'hog scraper, iron hog and calf gambrel, stunning instrument, large cleaver, small cleaver, skinning knives, boning knives, hog hook, meat saw, steak knife, pickle pump, sticking knife, and meat grinder' (2021).

In *The Three-Body Problem,* an assortment of tools is also needed to process Ye Wenxue from a live human subject into an explicit manifestation of meat skewered on a fork. These include 'antiques such as American carbines, Czech-style machine guns, Japanese Type-38 rifles; newer weapons such as standard-issue People's Liberation Army rifles and submachine guns', and 'even a few Chinese *dadao* swords and spears' (Liu, 2016, 4). In their reconstitution from sentient entities into dead meat, both Ye Wenxue and the vast number of animals killed for food disappear. Their subject status is annihilated, as both are hacked into impersonal pieces. While after her death, Ye Wenxue becomes an incomplete set of constituent parts that consist of two 'vinelike arms', 'half' of a 'head', and 'a single beautiful eye', so too do the animals slaughtered for consumption become another set of abstract terms, for instance, in the form of (chicken) breasts or thighs, or (lamb) legs (Liu, 2016, 5). Or, in a further disconnection of meat from what was once a live animal, these pieces of flesh and bone are wrapped up in brown paper terms that remove bodily associations in their entirety, such as beef, escalope, or hamburger. The issue with terms such as those used in *The Three-Body Problem* and in the exploitation and eating of animals, is that these words perform an erasure of the particular *who* that has been harmed (see Adams, 2020).

The use of the word 'fortunate' in the narrative to describe the death of Ye Wenxue versus the deaths of 'some others', further assimilates the oppression and fate of women with that of animals-as-food (Liu, 2016, 5). While this seemingly innocuous term can be easily overlooked, it is important to address, as it is just as much a part of the wider discourse that embeds and conceals violence as the terms discussed above. For Ye Wenxue to be considered 'fortunate' in death in this context, the narrative not only implies that there are better methods to be killed than others, which leads readers to ponder, if this is what is deemed fortunate, then what on earth constitutes an unfortunate death? But it also implants the notion this is what is best for her, that she should count herself lucky that she has fulfilled her lot in life to

become consumable pieces. The word ‘fortunate’ places the emphasis on *how* she died (practices) rather than on whether or not her death should have been allowed to happen at all (ethics). The method of her death becomes the matter of concern readers are invited to pay attention to and make judgments about, as opposed to the question of whether or not her death was just or fair. Due to this linguistic distraction, we instead become preoccupied with the lesser issue at hand.

This same application of linguistic deception can be perceived when we examine the marketisation of animals-as-food, in which the ‘moral reactive attitude’ of consumers is predicated on information provided in relation to practices, such as whether or not animals raised for consumption are from high welfare farms, free range, or killed humanely, without pain or as painlessly as possible (Podosky, 2019, 81). The importance attributed to practices obfuscates the greater moral quandaries and injustices of animal agribusiness, the most significant of which is whether or not animals ‘*ought* to die’ (Podosky, 2019, 82). This focus on modi operandi of death that distracts readers and consumers from the bigger injustices exacted against women and animals is inherently problematic, for, as Paul-Mikhail Podosky writes, ‘when our attention is directed toward the killing method, we take for granted that an animal can be rightly killed’ (2019, 83). This in turn further reinforces the concept of a ‘common oppression’, that the deaths of women and animals are both constructed as permissible, so long as we focus on the method of their execution and ignore the underlying ethical dilemmas that surround whether or not they should have died (Gaard, 1993, 7). It is the method, rather than the morality, which is the ‘meat of the matter’.

The insinuation at the end of this violent ordeal that Ye Wenxue did in fact want to die is another aspect that interconnects the woman and the animal-as-meat. In advertisements and popular culture, in which both women and ‘food’ animals are modelled as entities that

want to be consumed, Adams writes that 'the implication is that women and animals willingly participate in the process that renders them absent' (2021, 35). While the final line in this death scene reads, 'at least she died in the throes of passionately sacrificing herself for an ideal', this notion that Ye Wenxue offered herself up to death on a silver platter is contradicted just moments before (Liu, 2016, 5). The narrator states that after routine displays in which her comrades would 'stand on top of the building, wave a flag, shout slogans through megaphones, and scatter flyers at the attackers below', each time 'the courageous man or woman had been able to retreat safely from the hailstorm of bullets and earn glory for their valour' (Liu, 2016, 4). We read that Ye Wenxue 'clearly thought she'd be just as lucky—fortunate in *life* as opposed to fortunate in death (Liu, 2016, 4).

The description of her death as a passionate sacrifice, frames what has happened, what has been done *to* her, in a fundamentally flawed manner. While the narrative implies that she is a more than willing participant in her own death, in her own re-packaging as dead flesh, we see that she did not in fact desire her own death for an ideal, nor did she embrace the multitude of instruments that killed her, or the use of her corpse for human purposes in the form of 'target practice' (Liu, 2016, 5). She did not wish for death in the same way that a cow, lamb, or chicken does not yearn 'to be slaughtered, eaten, tortured, exploited, or otherwise harmfully interfered with' (Donovan, 2014, 77). However, as Adams argues, 'to grant that when they were alive they might have desired to stay alive would disrupt our patriarchal anthropocentrism' (2020, 131). Both Ye Wenxue and farmed animals are circumscribed to their fate as dead bodies to be served on the table of patriarchal culture. Both women and animals are 'only ever on the menu, and never at the table' (Eddo-Lodge, 2018, 178).

The demise of Ye Wenxue is even more impactful as it parallels the maltreatment and death of more-than-human characters such as the Dahurian larch tree we encounter in the second chapter. In order to authorise acts of violence and sanction the deaths of woman and tree, both are constructed as wild and monstrous entities that must be subdued. The metamorphosis of woman into wolf and of tree into 'giant' are discursive transmutations that subtly render both of them to be 'suitable' recipients of violence (Liu, 2016, 19). With one word apiece, each character becomes a manifestation of a monster that must be defeated for there to be some form of resolution and narrative progression. This linguistic sleight of hand is a process that endeavours to doubly 'other the other', of those subjects such as women and flora who are confined to an existence on the field perimeters of a dominant patriarchal monoculture. It is also significant that, just as our human character is perforated into pieces of flesh and bone, so too does the Dahurian larch tree become dead raw material in the form of timber. The reduction of both of these individual characters into mere flesh and wood, or what Willard Van Orman Quine classifies as 'mass terms', has a profound effect on the reader (2013, 89). Whether it is individual animals or women who are subsumed under the umbrella term of 'meat', or trees under 'wood', these terms not only conceal a multitude of individual harms and deaths, but also transform sentient entities into objects that have 'no individuality, no uniqueness, no specificity' (Adams, 2020).

What is key about the use of such terms 'is that we make someone who is a unique being into something that is the appropriate referent of a mass term' (Adams, 2020, 48). This process of desubjectification occurs 'by removing any associations that might make it difficult to accept the activity of rendering a unique individual into a consumable thing' (Adams, 2018, 6). In *The Three-Body Problem*, this dissociation between subject and object takes place when both Ye Wenxue and the Dahurian larch tree are broken down into their constituent parts. This is a process that Adams calls '*body chopping*' (2020, 59). What we

witness is a disassembly line that takes two whole entities in the form of woman and tree, and hacks them up into abject pieces of two bodily puzzles. Ye Wenxue becomes a butcher-counter-esque assortment of disembodied parts that we must confront like meat seen through glass or plastic, with cuts that consist of her 'vinelike arms', her 'young head', and her 'single, beautiful eye' (Liu, 2016, 5). In a similar vein to the list of terms attributed to dead 'food' animal parts, the Dahurian larch tree also becomes a Frankensteinian multiplicity of 'corpse' chunks that consist of 'branches', 'trunk', 'bark', and 'stump' (Liu, 2016, 19-21). When human and more-than-human subjects are fragmented in this way, it is difficult to conceive that moments earlier these were entities with unique and situated lives.

We are normally removed from the routine actions that process life into death, as a consequence of what Adams defines as 'the structure of the absent referent' (2020, 50). This is the separation of the end object(s) from the concept that they lived beforehand as women, animals, or plants—a structure that 'functions to put the violence under wraps' (Adams, 2020, 50). However, here, because we learn of the identities of the characters and are with them as they violently transition from alive subjects to dead and renamed pieces, no amount of semantic acrobatics can mask this butchery (2020, 50). In *The Sexual Politics of Meat*, we read that 'the process of viewing another as consumable, as *something*, is usually invisible to us', and this invisibility 'occurs because it corresponds to the view of the dominant culture' and 'because the end product of the process—the object of consumption—is available everywhere' (Adams, 2021, xxvi). *The Three-Body Problem* makes the invisible visible, and the origin stories of flesh and wood come to life. The lack of sorrow exhibited after the murder of Ye Wenxue parallels the dearth of sentiment on the death of the Dahurian larch tree.

3.3: Save The Swallows but Not the Poor: The Valorisation of The More-Than-Human World Over Humankind in *The Three-Body Problem* (2006)

The want of compassion towards those with whom we share the planet is further demonstrated later on in *The Three-Body Problem*, when we are introduced to Mike Evans. The environmentalist scion of an oil baron, Evans has been working in the 'barren loess hills' of northwest China, 'planting trees' in an effort to save a particular species of bird—a 'subspecies of the northwestern brown swallow', from the brink of extinction (Liu, 2016, 331-332). These swallows 'nest only here, but as the forest disappears year after year, they can no longer find the trees in which to build their nests' (Liu, 2016, 332). If the current rate of decline for this species continues, we learn that 'within five years it will be extinct' (Liu, 2016, 332). The verdant fruits of his labours are plainly written on this otherwise denuded landscape, as evidenced when we read that it was 'as though an old, yellowing canvas had been accidentally blessed with a splash of green paint' (Liu, 2016, 331). However, these small victories are soon undone, due to the desire to consume and make a quick profit without consideration for the more-than-human world. What land he has reforested in his time there, an almost-six-year-spell, is not permitted to come close to maturity before it is hacked down, a process that reiterates the intersectional oppressions of plant, animal, and human bodies that percolate throughout the narrative. In the death of this juvenile forest, we are prompted to remember the demise of the adolescent Ye Wenxue in the first chapter of the book, and the connotations in that scene of all of our animal kin also killed at a fraction of their natural lives.

The terrible fate of flora and fauna are further, and more explicitly, brought into communion with one another when the production team leader explains that 'the villagers originally planned to cut down the forest in a few more years—it's best to wait until the pig is

fat before slaughtering it, am I right?' (Liu, 2016, 338). This depiction of the local people as ravenous self-centred consumers devoid of an environmental consciousness must be problematised by the reader. The issue at hand is not their destructive actions, but rather, the lack of feasible and environmentally sound alternatives to those actions. Evans is aware that the decline of the forest and its swallow inhabitants has deeper roots than what appears at first to be superficial avarice. This is a realisation manifested when he explains to his visitors that 'everything you see before you is the result of poverty' (Liu, 2016, 339). In this statement, Evans demonstrates a consciousness of what I will term contextual moral environmentalism. This phrase is an extension of Deane Curtin's 'contextual moral vegetarianism' (1991, 68-71). Just as Curtin argues that it is not practicable for all of humankind to shirk animals-as-food due to particular socio-economic and geographic contexts, so too is it equally problematic to assume all people are able to commit to acts of environmental preservation. This chapter of the novel instead situates such conservation work as a choice that cannot be made and sustained outside of certain privileged circumstances. While Evans confesses he could use his inherited fortune from his father to 'easily ask them to stop' the deforestation and 'plant more trees', an effort that 'could make all the loess hills within sight be covered by quick-growth forest', he reflects that this would be futile, for in his perspective, it only offers a short-term solution (Liu, 2016, 339). The future of the forest and its swallow populace would still remain uncertain.

Evans's decision not to respond to the deprived conditions that have created these issues in the first place, and have left these people with no viable substitute to survive, can be perceived as the cause of more harm. His choice to valorise the forest and its birds, but to overlook the poor, helps to maintain the socio-economic structures of oppression that imperil such attempts at environmental stewardship. When no action is taken to negate the need for conservation—in this case, a reluctance to address the socio-economic conditions that are the

root cause of this impatient deforestation in the first place—then such preservation efforts are ultimately ineffective, and liable to become undone. While it is easy to decry their ecocidal actions, for the people to survive in a locale and circumstances that offer no other choice, the decision to uproot the forest is one that is forced upon them. Whereas the decline of the forest and its concomitant birds represent a moral issue that Evans wishes to address, the needs of the destitute people that reside in the area, and who are just as much an integral part of this place, fall below his moral radar of consideration.

Although both the resident swallows and local people are vulnerable and require different kinds of support from the forest in the form of a place to nest and for financial survival, the needs of the birds are valorised, while those of the poor are not considered a matter of concern. The circumstances of people are as inconsequential to him as the lives of trees and birds are for much of humankind. The environmental ethic of care Evans practices is thus one that operates on processes of exclusion. In addition to the fact that it is not workable for those not economically well-off, his policy of care and the 'basic tenet' of his doctrine of 'Pan-Species Communism' that 'all lives are equal', is an ethos that does not extend whatsoever to humankind (Liu, 2016, 335). Whether rich or poor, Evans conflates all of humankind in a universalistic manner, as one collective environmental 'bad', not to be looked on with compassion, but with contempt. This belief that the 'entire human race is the same' is reflected in his declaration that 'humans do not need saving. They're already living much better than they deserve' (Liu, 2016, 339, 332). We are thus presented with a selective model of care in which certain entities—and in this case the emphasis is on the impoverished—are discounted.

The representation of the poor as victims of hardship who will find it difficult to survive if the forest is preserved places them on par with the threatened swallows, another

overlooked class who also depend on the trees for their survival. This is another significant form of intersectional oppression found in the novel, for the imperilled condition of the forest and its resident birds is also the imperilled condition of the human poor. However, the misanthropic Evans refuses to address this mutual vulnerability, and, as such, it is just those from the more-than-human world he deems important to save. This establishment of a moral dualism between the poor humankind and the more-than-human world of flora and fauna, and in which humankind is also perceived as an uncontextualized collective that stands between the environment and its salvation, leads to the creation of a set of lesser and problematic others. This is a practice that reinforces interspecies oppressions rather than breaking them down and repairing them. It is a response to one sort of harm that causes another form of harm to rear its head. The ethic of compassion Evans shows towards the forest and the swallows, and the lack of compassion he exhibits towards humanity, can be traced to a particular moment in his childhood. He recounts a memory from when he was twelve: an oil tanker from his father's company 'ran aground' and spilled over 'twenty thousand tons of crude oil' into the Atlantic Ocean (Liu, 2016, 333). However, devoid of concern for the catastrophic impact this accident has on the environment and its wildlife, we learn the principal concern of his father 'was how to avoid responsibility and minimise damage to the company' (Liu, 2016, 333).

When twelve-year-old Evans visits the coast to see the aftermath and search for birds that are still alive, he reflects how the birds he found were locked in a battle against time to remain animal subjects and not become inanimate matter, as they laboured 'in the sticky oil, looking like black statues made out of asphalt, only their eyes proving that they were still alive' (Liu, 2016, 333). In spite of his best efforts to save them, most of the birds perished. Once more the response of his father to this awfulness is one of anthropocentric indifference. He tells his son 'we can have no sea birds, but we can't be without oil', and that all else 'is

secondary' to 'the existence of the human race and their comfortable life' (Liu, 2016, 334-335). This apathetic encounter illustrates that the most influential human actor in his life, his father, has not provided a rationale for an ethic of care towards humankind to develop from childhood, and, as such, it is to the more-than-human world that he looks to extend his compassion. This moment seeded within him the belief that humans, and the way in which they think and act, has been nothing but a source of problems, a fountain that rains oil and deforestation and other environmental ills on the planet.

We can see why the abject horror of this childhood experience resulted in the fruition of an ethic of care for the more-than-human world and a contempt of humankind that extends into adulthood. It is evident that, because of his personal experiences, the fate of certain taxa such as trees and birds are more morally significant to Evans than humankind, and subsequently influence his choice of who to save when an inter-animal conflict between swallows and the human poor arises. However, it is important to underline that all of these entities, trees, birds, and humankind alike, deserve life and to have their basic interests met. Therefore, we need to transgress these self-imposed restricted boundaries of moral consideration as epitomised by Evans. Karen S. Emmerman points out that what we need instead is a 'pluralist, non-hierarchical, and contextualised' ethic of care, one that 'does not give pride of place to any one kind of interest or creature' (2014, 162-163). In other words, in order to uproot all forms of oppression, we require a more inclusive, intersectional ecofeminist expansion of the circle of those whom we care for—one in which the well-being and trials and tribulations of all entities are addressed in tandem, and in which no person—plant, animal, human, or otherwise—is perceived as less than another due to their species, race, sex, or class. While Evans positions humankind in opposition to the more-than-human world, he fails to realise that human concerns also fall under the umbrella of environmental welfare, and thus cannot be isolated as a non-issue that is separate from an ethic of care for

flora and fauna. In a world in which we are part of an interconnected and interdependent network of entities, we all have a moral commitment to look after the basic interests of both humankind and the more-than-human world in equal measure—to create and enact an ethic of care, respect, and justice for all, and not just for some.

3.4: Troll! In the (Space) Dungeon! More than a Quibble: The Maltreatment of Trolls and Their Misuse in Scientific Experimentation in *The Long War* (2013)

The exploitation of the creatures known as trolls arises in the second book of *The Long Earth* series, *The Long War*. In the first chapter, we are introduced to a female troll and her cub, who are imprisoned in a human-operated research laboratory, in which they are used for experimentation in space. This lab has been built on a world next to 'the Gap', an Earthless void that is the result of a substantial meteorite impact (Pratchett and Baxter, 2014, 10). We read that humans 'were building a space programme out there, and wanted to see if troll labour, highly useful across the Long Earth, could be exploited in the Gap' (Pratchett and Baxter, 2014, 10). While at first they attempt to benefit from the labour of adult trolls, it is soon evident that these creatures are, understandably, as a species that have had their feet firmly planted on the earth of the stepwise worlds, 'very reluctant to step over into that drifting emptiness' (Pratchett and Baxter, 2014, 10). Thus, it is the cubs who are summoned to become the new test subjects, trained up to become habituated for a lifetime of toil in space on the behest of humankind.

The mother of this cub is reluctant to proffer her cub up to their human captors in order for him to learn to become an extra-terrestrial labourer for the benefit of humankind in the hostile emptiness of space. We will not use the human name forced on this creature by her

human tormentors when she has a troll name of her own, though this is a name that, due to human indifference, we never learn, as evidenced when we discover that 'no one knew what the troll called herself' (Pratchett and Baxter, 2014, 9). The cub in this chapter does not even possess a thing so quotidian as a name—either troll or human. Instead, he is reduced to an 'it' as we see when we read that the cub was 'dressed up in its own silvery spacesuit, with wires dangling from sensors attached to its flat skull' (Pratchett and Baxter, 2014, 9). This one little word is an act of semantic violence which both normalises and reinforces the disposability of animal bodies. When we devalue and metamorphose animals into objects in this way, we distance ourselves from our unethical actions towards other-than-human animals and enter into delusions that these are not sentient entities who are capable of harm. The maltreatment of our animal kin in such institutions is concealed behind more than just brick walls. While the attribution of human names and clothes in this chapter help to fabricate the illusion that 'animals in laboratories are participants and co-workers', these entities are not treated as equals (Matsuoka and Sorenson, 2018, 12). To pretend that this is so, write Atsuko Matsuoka and John Sorenson, 'grossly distorts the realities of animal exploitation' (2018, 12). In other words, it is oppression all dressed up in the garb of equality.

When humankind aspires to venture into space with the use of other-than-human animals in order to do so, we are confronted with a turbulent ethical conflict between the transcendent ambitions of humankind in the name of science, and those of troll-kind in the name of sheer unviolated existence. The space cadets and trolls disagree about the use of their cubs as research specimens for the benefit of humankind. This prompts readers to consider the well-documented maltreatment of other-than-human animals in the real-world whose lives were fractured so that humankind could blast off and explore the cosmos. It is due to this pattern of exploitation established external to this fictional scenario that we are well-equipped with a plethora of examples that validate the disquietude of the troll mother in terms

of what could happen if she were to relinquish her cub to this cause. The use of other-than-human animals as experimental subjects in space research is an unethical blot that mottles the histories of human space exploration. Just as humankind endeavours to instrumentalise troll cubs as labourers who will benefit their extra-terrestrial aspirations, so too is the real-world space sector culpable of a lack of ethical concern for the treatment of our animal kin due to scientific hubris.

If we examine our space-faring past, we will note that, in order for humankind to take one small step on the moon on July 20, 1969, a substantial amount of our animal kin suffered. In a similar vein to the trolls who are taken from the rest of their band and confined and trained in a lab, worlds apart from them, the animals used for real world space exploits were also forcibly extracted from their lives without their consent. Russian scientists snatched 'stray dogs off the streets of Moscow', one of whom, named Laika, was launched into space with no provision for her return, and thus became 'the first and (allegedly) only creature knowingly sent into space to die' (Gaard, 2017, 94-95). America, meanwhile, 'funded the capture of young and infant chimpanzees from Africa for space exploration tests' (Gaard, 2017, 96-97). In a real-world parallel to what almost occurs to the troll mother in *The Long War*, in order to prevent the trouble of maternal resistance, 'chimpanzee mothers were killed in order for their babies to be taken' (Gaard, 2017, 94). Once captured and confined in research laboratories, these animals were subjected to experiments in order to examine 'the effects of rapid acceleration, prolonged weightlessness, atmospheric re-entry, and other hazards of space travel' (Gaard, 2017, 93-94). The casualties proliferated.

One crucial detail in this narrative provides readers with a direct link to this past (mis)use of other-than-human animals in space research—the name attributed to the troll cub. It is important to note precisely when we discover this specific detail, for it reveals a lot to us

about the motivation behind it. While in the first half of the narrative the troll remains in a state of thinghood as an 'it', there is a marked transition in the latter half of the book in which he metamorphosises into a named subject by the name of 'Ham' (Pratchett and Baxter, 2014, 246). Greta Gaard writes that Ham was the first chimpanzee to be launched into space on 31 January 1961 (2017, 94). The transformation of the troll from object to subject recalls the circumstances that surround the naming of his chimp namesake. Gaard elucidates that 'originally nicknamed "Chop Chop Chang," chimpanzee #65 wasn't given his official name—an acronym dubbed after the *H*olloman *A*ero-*M*edical Research Laboratory where the space chimps programme developed—until it was clear he had survived his seventeen-minute flight' (2017, 94). This was because the authorities, should the mission have to be aborted, 'did not want the public worrying about the death of a famous and named, even if not quite human, astronaut' (Haraway, 1989, 138) Thus, just as the first Ham was not named until the watchful gaze of the public was on him as he returned to planet Earth, so the fictional Ham only shifts from object to subject due to the attention focused on his case, a public furore that surrounds his maltreatment and proposed use in experimentation. While to be an 'it' creates a certain amount of emotional distance between human scientist and troll test subject, the provision of a name seeds the illusion that these space cadets provide the trolls with a modicum of respect—that the trolls are more than just a source of data and labour, an animal means to a human end.

In a concentrated effort to demonstrate her refusal to cooperate and hand over her cub to the spacemen, the troll mother uses all the means of communication at her disposal. In addition to clear behavioural cues which express her dissent, as exhibited when we read that she 'held her cub to her powerful chest', we also read that she makes use of hand 'gestures' that are 'rapid' and 'hard to follow, but decisive' (Pratchett and Baxter, 2014, 9). The narrator states that 'the language trolls were taught in experimental facilities like this one was based

on a human language, American Sign Language' (Pratchett and Baxter, 2014, 11). This is a crucial point to note, because it means that the human space cadet oppressors can, in fact, comprehend her nonverbal gesticulations—but that they choose not to listen. The troll mother communicates over and over three words: '*I will not. I will not. I will not*' (Pratchett and Baxter, 2014, 12, italics original). However, her voice remains unheard. Josephine Donovan writes that 'we should not kill, eat, torture, and exploit animals because they do not want to be so treated, and we know that. If we listen, we can hear them' (1990, 375). This is best illuminated in *Beasts of Burden: Animal and Disability Liberation* (2017), in which Sunaura Taylor elucidates that 'animals consistently voice preferences and ask for freedom. They speak to us every day when they cry out in pain or try to move away from our prods, electrodes, knives, and stun guns' (63). If we were truly unaware of the wishes of other-than-human animals, writes Taylor, then 'factory farms and slaughterhouses would not be designed to constrain any choices an animal might have'—and the troll mother and her cub would not have been confined in an underground lab cell from which they cannot step away (2017, 63).

This encounter underscores the significance of who is allowed to speak and whose speech merits the attention of listeners. This is a one-sided conversation between humankind and another entity, in which both the power to speak and to be listened to exclusively reside with the former. While the troll mother does express herself in this scene in a translatable manner, her voice becomes another backgrounded aspect of troll lives, muted in the face of humans and their aspiration to build a space programme—irrespective of the hardship that this causes to their animal kin. The fact that the alternate, but equally valid, methods of communication that she draws on are overlooked, can also be interpreted as a comment on the intersectional oppression of other-than-human animals and the disabled. More often than not, the voices of both the more-than-human world of animals and those of disabled people

are overlooked. While nonhuman animals are commonly excluded from consideration due to a speciesist valorisation of human perspectives, the voices of disabled people are also passed over in a number of manners. For instance, Taylor points out that 'it is considered acceptable to talk for us instead of to us—or, in the case of those who are nonverbal and "severely" intellectually disabled, instead of to the people who know them and their interests best' (2017, 16). In this refusal to acknowledge both nonhuman animal and disabled human voices, we can observe an undercurrent that these perspectives are somehow less than those that are spoken orally, that different modes of expression to the dominant oral discourse of humankind are conflated with some form of lack. This inherently problematic concept, built on 'ableist paradigms of language' serves to enable the persistent omission of the sentiments of other-than-human animals and disabled people from everyday life (Taylor, 2017, 53). Just because the troll mother in this narrative does not, and physically cannot, speak with human words from her mouth, her wishes are rendered inconsequential, which is a factor that causes her undue emotional and behavioural distress.

When one of the space cadets becomes impatient and moves to stun the adult troll in order to remove her cub from her protective care, she is left with no recourse but to partake in a violent act of resistance. This resonates with Martin Luther King Jr's acknowledgement that 'a riot is the language of the unheard' (Weber, 2020). When peaceful protests are ignored, there comes a breaking point, whereupon violence is the only recourse and means of preserving that which we hold dear. When approached with the stunner, this troll 'grabbed the rod, snapped it in two, and jammed the sharp, broken end into the second man's right eye' (Pratchett and Baxter, 2014, 10). Just as the behaviour of our animal kin in the real world 'speaks their desire' for liberation as they 'run away from hunters, fight against other predators, and struggle to free themselves from zoos, leg-hold traps, science experiments, and other forms of confinement', so this revolt in the narrative denotes an ardent opposition to the

maltreatment of troll mother and cub at the hands of humankind—a last-ditch attempt to rescue her cub from a lifetime of human servitude and potential death in the velvet darkness of outer-space (Gaard, 2017, 36).

Thereupon, the troll mother, cub-in-arms, 'her fur splashed with human blood, repeated the gestures she had made, over and over' (Pratchett and Baxter, 2014, 10). The fact that her desire is reiterated on a loop after this encounter is testament to her fear that, even now, her voice will be unheeded. In his book *Fear of the Animal Planet: The Hidden History of Animal Resistance* (2010), Jason Hribal documents multiple such instances of violent and even lethal acts of resistance to the abuses inflicted on animals by humankind in laboratories, zoos, and circuses. Gwen Hunnicutt writes that the majority of these assaults, much like in this case of troll versus human, 'were responses to abusive treatment or misery of confinement' (2020, 94). Such examples show 'not only the danger posed toward humans by exploiting animals in violent industries, but also that animals are not passive, that they have interests of their own, and that even the most terrorised animals will fight for their own life' (Hunnicutt, 2020, 94). The human response to such attacks, as is the case in this narrative, is often to move to kill the 'offending' animal(s).

The reward for the troll and her brave act of resistance borne out of maternal love is that her attackers immediately 'had tried to put down this troll' and had 'even pulled a gun on her' (Pratchett and Baxter, 2014, 11). This is a fictional example of a macro real world epidemic, and *Fear of the Animal Planet* is replete with such death sentences imposed on our animal kin who have endeavoured to resist such human-inflicted cruelties. For instance, Jeffrey St. Clair writes that, in 1903, a death warrant was issued for a circus elephant who had killed three of her handlers—one of whom had caused her extreme torture as he repeatedly struck her with clubs, stabbed her with pikes, and forced her to consume lit cigarettes (2010,

8). For her so-called crimes, enacted in resistance to the maltreatment of humankind, this elephant was ‘shackled’, forced to consume ‘carrots laced with potassium cyanide’, and ‘jolted with 6,600 volts of alternating current’, whereupon she departed this world and all of its wretchedness (St. Clair, 2010, 8).

We would be unconscious of this brutal exhibition of human power over an other-than-human animal in *The Long War* if it were not for its illumination due to a ‘leaked’ video clip from inside the laboratory (Pratchett and Baxter, 2014, 11). This a point that prompts us to contemplate that lots of animal abuse cases remain secreted behind institutional walls or are suppressed due to ‘ag-gag’ laws (anti-whistle-blower laws that apply within the agriculture industry), and that we are provided with a mere snapshot of the countless atrocities that our animal kin are subjected to on a routine basis. However, with the release of this video into the public domain and its transformation into an online ‘sensation’, comes a crack in these institutional walls that conceal (Pratchett and Baxter, 2014, 11). In response to this leak, we read that ‘a flood of similar reports’ pour forth that paint a vivid picture of ‘cruelty to beasts, and especially the trolls’ across these parallel worlds—a sort of internet switchboard that emphasises the sheer scale of oppression (Pratchett and Baxter, 2014, 11). While these appear to be isolated incidents that are worlds apart, these individual acts, much like those from the real world that are discussed in Hribal’s book, knit together into a connect-the-dots of animal abuse.

Due to public clamour, this incident becomes the most notorious case of troll maltreatment across the worlds. However, there are a number of other incidents that occur external to the concealed world of animal research and that provide windows into alternative domains of exploitation. In the second chapter of *The Long War,* we read of a troll cub who has been murdered, their body hacked into pieces, butchered ‘for some kind of folk medicine’

(Pratchett and Baxter, 2014, 18-19). For the troll mother and her cub at the space research lab, justice does not prevail—no one is prosecuted for their maltreatment, and the trolls escape from their prison with the help of two empathetic humans. Yet, due to the public furore that surrounded the case, a precedent of what *not* to do in such instances has been established. Therefore, the human responsible for this latest act of troll abuse has 'been arrested on a cruelty charge', but 'his family are kicking up because, what the hell, it was just an animal, wasn't it?' (Pratchett and Baxter, 2014, 19). These perceptions of troll lives as inconsequential stem from a speciesist sentiment that humankind is somehow separate from the rest of our animal kin—that we have been afforded a power over the other-than-human world that accords us the freedom to do what we will with them.

This delusion in the narrative is, in part, to be blamed on the biblical book of Genesis and its discourse of human dominion 'over fish, fowl, cattle, and creeping things' (Pratchett and Baxter, 2014, 11). It is this moment of our cultural past which, for a portion of the population, provides material evidence with which to prop up a dualism between humankind and the rest of the animal worlds. To consider animals as different from humankind, write Gordon Hodson and Kimberly Costello, 'effectively places them outside of our "circles of concern" (Opotow, 1990), rendering them less protected by concerns with justice, fairness, equality, or morality' (2018, 185). This desire to maintain the circle with humankind comfortably inside it and all else outside it is reinforced when the family protest that the troll cub is 'just' an animal. This semantic act of violence attempts to erase the fact that these creatures are also 'subjects-of-a-life' who 'suffer and feel pain, and thus deserve not to suffer' (Gaard, 2017, 36).

In another instance in Chapter Sixteen of *The Long War*, we read that one of the airships that transports both humankind and merchandise across these parallel worlds makes a

stop at a forest operation. While the human travellers view this land from the air as ‘a neat little rectangular patch etched out of the green, an oddly touching island of humanity all but lost in this global forest’, once scrutinised it reveals a darker and more exploitative reality (Pratchett and Baxter, 2014, 117). The narrator states that ‘when you looked more closely you could see that it was not humans who had created the clearing but a party of trolls, under the direction of a human, labouring even as the passengers looked down on them’ (Pratchett and Baxter, 2014, 117). It remains unclear whether these trolls are here of their own volition, but the implication is not, for ‘their overseer carried a whip’—an instrument of abuse that would prompt any troll with an iota of free will to step elsewhere (Pratchett and Baxter, 2014, 118).

In this scene, the trolls are compelled with violence to tear down the very trees that have been part of their worlds-wide home since before the arrival of humankind en masse to the stepwise worlds. It recalls a similar episode from the final book in *The Chronicles of Narnia* series, in which humankind whips the sentient and free horses of Narnia and forces them to cart away the felled trees that were once part of their home in order to profit from them in their own lands (Lewis, 2015, 24-26). As the airship traverses the skies of these alternate worlds, other aerial observations reinforce this undercurrent of enslavement, as the travellers look down upon ‘gangs of humans driving troll bands one direction or the other across the Long Earth’ (Pratchett and Baxter, 2014, 121). These momentary ‘glimpses’ of exploitative human-troll relationships, persisting across multiple worlds and vanishing ‘in a second or two’ as the airship steps ever onwards have an important function (Pratchett and Baxter, 2014, 121). In *Critical Animal Studies: Towards Trans-Species Social Justice* (2018), Sarat Colling discusses occasions in which human commuters ‘cross paths with animals being transported to slaughter’, and argues that ‘transport’ is a locus ‘where the cruelties of animal agriculture become visible, if only for brief moments’ (35). These little snapshots of

animal oppression in the narrative, when collated, paint an expansive picture of the universalism of human violence enacted on the trolls.

The response of the trolls to their maltreatment is for them to reach a consensus to leave all of the human-inhabited stepwise worlds. Sally, one of the two space troll liberators, states that the trolls are 'not dumb animals you see. They learn, and they modify their behaviour. And now, they have learned all they need to know about us' (Pratchett and Baxter, 2014, 244). The fact that the trolls have suffered so much due to humankind when these entities have been the cornerstone of human colonisation across these parallel worlds, provides them with no particular reason to want to return. In order for humankind to resolve its fractured relationship with troll-kind and encourage them to return to the human occupied worlds once more, Lobsang, speaking as a representative of humankind, tells them that they are sorry 'for the way humans, some humans, have treated trolls' (Pratchett and Baxter, 2014, 462). In an effort to demonstrate that attempts to mend relations between the two species are more than just idle words, he tells the trolls that in America, there are lobbies which seek to persuade the US government 'to grant trolls human rights' (Pratchett and Baxter, 2014, 462). While 'there was no way to ensure that every human everywhere would behave as decently as they should', it would hopefully be the end of their trials and tribulations and the start of a more harmonious coexistence (Pratchett and Baxter, 2014, 462).

However, these are not the only examples of inter-species exploitation to be found in the series. While *The Long Earth* mentions elven humanoids who farm and eat the brains of another sub-species of elf (known as 'lollipops' due to their sizeable heads), in *The Long Mars* we encounter a world in which a sub-species of crabs has evolved to become dominant (Pratchett and Baxter, 2013, 355). These crabs exploit other forms of shellfish for food, as evidenced when we read that shrimp-like creatures 'were corralled into a rough square,

ringed by walls of stones heaped up on the sea-bottom sand, and patrolled by some kind of crab' (Pratchett and Baxter, 2015, 161). This is also a place that does not shy away from cannibalisation, as the crabs considered enemies of the monarch are fed alive to his children in their nursery pool, and become little more than 'a mess of fragments of flesh and shell' (Pratchett and Baxter, 2015, 167). Other crabs are coerced with the aid of a 'whip' to labour in this civilisation in various roles such as 'draught animals' and 'construction workers', with those considered less intelligent used to transport their so-called superiors (Pratchett and Baxter, 2015, 163-165). This world is also not kind to female crabs, whose bodies are under the control of the crab monarch. We read that the monarch of this world surrounded himself with 'a circle of odd-looking acolytes, pink, vulnerable-looking' (Pratchett and Baxter, 2015).

These creatures are female crabs whose bodies are in a shell-less limbo for the pleasure of their ruler. One of the explorers on this world notes, 'in some crab species the females are mated just after moulting, when they're softer' (Pratchett and Baxter, 2015, 167). It is thus concluded that the crab monarch must have some method 'to keep his harem from forming new shells. Thus, keeping them sexually available for whenever he feels the urge' (Pratchett and Baxter, 2015, 167). Both of these instances demonstrate that exploitation on these worlds is not just between humankind and its animal counterparts, but between other sentient entities as well. This results in a sense of inescapable tragic universalism, for to travel across thousands of worlds and still find this behaviour frames it as inevitable. With this cross-worlds map of unethical ruptures in the fabric of human and other-than-human animal relations, Terry Pratchett and Stephen Baxter open a series of windows through which we must 'bear witness' to that which is ordinarily shielded from us (Purdy and Krajnc, 2018, 45). These sites of harm, whether it is the laboratory, the forest, or a crab civilisation, prompt us to examine 'geography and the ways in which violence moves along its contours and

across its latitudes' (White and Springer, 2018, 162). For cruelty towards animals is endemic across the stepwise worlds, and each glimpse is a microcosmic piece of a multiversal puzzle.

Chapter Four

Trees with Three Faces: A Cross Section of the Malevolent and the Benevolent Forest in *The Long Earth* and *The Three-Body Problem*, and the Growth of the Woodland-in-Peril

4.1: Introduction

This chapter is concerned with the dualistic ways in which the forest has been represented across different cultures. These representations have vacillated between the depiction of the forest as a benevolent environment of wonder and enchantment, and a malevolent landscape of fear. In addition to its treatment of the societal construction of the forest as either a *verdurous sanctum* or an *inferno verde*, the chapter also examines a nascent third delineation of the woodland as a threatened terrain in need of protection. I begin by offering a brief overview of the motif of the malevolent forest in popular culture. The chapter then focuses on the prevalence of the wicked woodland in fairy stories. This discussion is a foundational requirement in order to comprehend the way in which the children in *The Long Earth* come to experience the forest of a parallel planet, for they hail from a cultivated concrete world in which the wild woodland is the stuff of fiction, a place of voracious wolves and cruel witches.

This discussion of the influence of narrative on childhood attitudes toward the arboreal wilderness is then followed up with a note on the brief intrusion of the fearsome forest in *The Three-Body Problem* (2006), in which I critique the way in which this idea of the malevolent woodland found in childhood stories resurfaces in adulthood. The chapter then departs from the influence of fairy stories on our fear of the forest in order to examine

another thread of this dread found in *The Long Cosmos* (2016). This is a fear of the trees themselves, and not the terrible creatures housed in the forest, triggered by childhood sexual abuse. The next part of the chapter addresses *The Long Earth* and its depiction of the forest as a welcome departure from an otherwise war-torn world, and how it parallels the theme of woodlands as separate from the chaos of the world without found in *The Lord of the Rings* (Tolkien, 1954) and *The Chronicles of Narnia* (Lewis, 1950-1956). The chapter concludes with an exploration of the start of a cultural evolution from the malevolent or benevolent forest in popular culture, to the woodland-in-peril, as exemplified in works such as *The Little Red Wolf* (Fléchais, 2017) and *Silent Spring* (Carson, 1962).

In order to understand the complex relationship that we have with the forest, we must first examine, in brief, the delineation of forests in fiction across time. In his seminal work, *Forests: The Shadow of Civilisation* (1992), Robert Harrison traces the motif of the terrible woodland in classical western literature. The representation of the forest in the selected literature is of an environment that does not favour human encroachment. Those who wander into the woodland without heed often do not leave due to an abominable circumstance such as bewitchment concluded with a violent death. The menace of the forest in classical literature is also attributed to its depiction as a terrain of bewilderment in which one can soon become disorientated, or in which one must circumvent voracious wolves and outlaws and wild men to reach the world without once more. The cultural tradition of the malevolent forest has continued to make itself known. For instance, in *Weird Woods: Tales from The Haunted Forests of Britain* (2020), John Miller has curated twelve stories published between 1880-1936, which mark the woodland as an eerie place of human demise. The *selva oscura* (dark wood) in this collection metamorphoses into a terrain of eldritch phenomena in which one must beware of the supernatural entities the woodland could house, as well as the treacherous nature of the trees themselves in their aversion to most of humankind.

The enchanted forest of Mirkwood in *The Hobbit* (1937) is another example of the abhorrent arboreal that is as prolific as tree lichen in western literature. Those who enter this forest are forewarned not to venture from the path if one should wish to find the exit and avoid the massive arachnids who poison and ensnare incautious wanderers as oversized flies. One must also come forearmed with food and drink, for there is little to be found within. The lone stream that traverses the trail is bewitched, so all who drink from or bathe in it are overcome with exhaustion and amnesia, and the woodland flora are not deemed suitable fare either, due to their lacklustre leaves and unpleasant bouquet. The fearsome forest is further entrenched in its sequel, *The Lord of the Rings* (1954). Yet, in contrast to the former forest in which peril is ubiquitous with the exception of the trees, in this oeuvre it is the trees themselves who are the predominant menace, due to their ill will toward all who cross the threshold of the forest. These denizens of The Old Forest are usually content just to watch those who enter their woodland. However, their behaviour can escalate from micro-aggressions such as the drop of a branch or the protrusion of a root intended to wound the intruder to more serious assaults. There is one tree in particular, Old Man Willow, whose predilection is to musically lull one to slumber beneath it and then consume one within his trunk. The notion of woods as the loci of all that is wretched has persisted and afforested modern culture as well. The Forbidden Forest rife with nefarious entities in the *Harry Potter* series (1997-2007) is one example, as is the Evil Forest in the video-game *Final Fantasy IX* (2000), in which one must battle all manner of foul flora and fauna. This is coupled with mainstream cinema, which continues to cite the forest as evil in films such as *The Cabin in the Woods* (2011) or *Blair Witch* (2016).

The bombardment of the malevolent forest motif in popular culture has resulted in an acute forest phobia in the collective consciousness of humankind. This concept of the woodland as a landscape of fear is a subset of a more extensive dread of the natural world

that Sophie Christman defines as the 'cultural illness' of ecophobia (2020, xiv). This is an affective condition that Simon Estok describes as an irrational fear and (or) chronic aversion to the natural environment (2020, 1). In his seminal work *The Ecophobia Hypothesis* (2018), Estok writes that ecophobia is in part a maladaptive societal acquisition, a 'learned behaviour' perpetuated in popular culture, as demonstrated, for instance, in the persistence of the perilous forest trope (2020, 8, 23). This epidemic of ecophobia in popular culture is a crucial matter of concern, as depictions of nefarious natures have 'material consequences' that influence how we respond to environmentalism (Alaimo, 2001, 279-280). This is an issue that receives further attention in *Plant Horror: Approaches to the Monstrous Vegetal in Fiction and Film* (2016), in which we read that, while instances of the terrible natural environment in literature and film quash, in the short term, the notion of nature-as-backdrop and thus promote, for a time, a more nature-centric attitude, these delineations ultimately 'only accentuate and potentially justify an existing ecophobia' (Parker, 2).

This fear of the natural world is also, in part, hardwired, due to an inherited component which has preserved humankind from such hazards as snakes or arachnids (see Roach, 2001). It was once a beneficial adaptive trait to be cautious of the forest if one valued one's self-preservation, for the woodland was a shadow-terrain of wild animals such as wolves as well as the lair of outlaws. But the sustained fear that we harboured toward the forest in western culture is now obsolete. Elizabeth Parker underscores our unreasonable dread of the woodland in the present when she writes that, firstly, this landscape does not feature in the routine lives of most of the western population, and secondly and thirdly, 'most of its predators that have been seen to endanger humans, such as wolves and bears, are now threatened with extinction—and it is much more common for humans to die in towns and cities, than in the midst of the woods' (2020, 2). What is more, this protracted fear of the forest is also destructive, for it maintains the tense oppositional relationship between the

woodland and humankind. This in turn causes widespread indifference about the survival of our arboreal loci in the modern epoch.

4.2: Fee Fi Fo Fum! Fairy Stories and Fear of the Forest in *The Long Earth* Series (2012-2016) and *The Three-Body Problem* (2006)

The cultural influence of traditional folk and fairy stories has had a profound impact on how children perceive forestscapes. If we examine the content of these stories, which are one of the first places in which many children encounter the natural world, and thus shape and inform what children understand about forests, we can perceive how such tales have inculcated children with the concept that the woods are nefarious loci where harm will befall them. The idea of the forest as a hostile environment is rife in this canon of literature, and it is thus important to delineate how these tales underscore the position of forests in the minds of children as loci of fear and peril. If we want to understand the dread children harbour towards forests, there is no better place to look than in their exposure to these tales. Those children who have encountered the fairy stories of Jakob and Wilhelm Grimm, for instance, many of which occur in forests, will have surfaced from these stories armed with a list of reasons why forestscapes are perilous loci. These stories embed in children the fear that, if one should enter the forest, there are manifold opportunities for malintent. If the child should venture into the forest, as these tales warn, one could become bewitched at the hands of a wicked witch, and be transformed into an animal, plant, or mineral.

The forests of these stories are also depicted as the habitats of monsters, places in which children can become a delicate morsel for voracious wolves or cannibals. In addition to the eaters-of-children the forest is said to conceal, it also contains a host of other foul entities that could deceive, wound, or kill a child. There is one tale in particular, ‘The Spirit in the Bottle’ (see Grimm, 2011, 359-362), in which a child in the forest finds a bottle buried

beneath an oak tree, which contains a toad-shaped creature who cries to be freed. The child, in their innocence, releases the toad, but it is in truth a malevolent spirit who wishes to throttle said child. The other stories we read warn of all sorts of stock-in-trade villainous characters. For instance, in 'Iron John' (see Grimm, 2011, 483-489), there is a wild man who resides in a pool in the forest who, if one should walk too close, will extend his arm out of the water in order to seize his victims and draw them under, while other stories are replete with unicorns and wild boar who could tear a child to pieces with their horns and tusks, and companies of men who are killers and thieves. There are also multiple narratives in which children become lost in the forest. The forest becomes an impossible and endless dark maze which disorients the child and fuels their fear of death from starvation or weariness. When the children of these stories find themselves off-course in the forest, terror and panic ensue, which thus leads them to wander further into the arboreal labyrinth.

While it is simple to problematise this canon of stories which appear to establish forests as foul places in which children do not fare well, we must also note that no child is harmed at their conclusion (with the exception of one or two who were wicked and deceitful), and there are in fact cheerful resolutions to be had for all. It is kindness and a sharp intellect that are the salvation of children who find themselves in the forest. The children who are bewitched in these tales are delivered from the enchantments placed on them, either due to the benevolence of another, or because the wicked witch or dwarf who has entrapped them has been killed. If we look to stories which address the devourment of children in the forest, in these too the victims are liberated, either of their own volition, such as when their captor is roasted to death in her own oven or pulled into the water and drowned, or because someone else comes to their aid. The wolves who swallow little children whole, for instance, have their stomachs cut open while asleep so that their dinner can escape, and are then filled with stones and sewn back up, which causes them to perish for their crimes.

The feral animals and other villainous entities of the forest who seek to trick or harm those who cross its threshold are also dealt with, so that one can travel in the forest unimpeded. Beasts such as wild boar and unicorns are lured into traps and contained, and the child who releases the toad-esque malevolent spirit buried beneath the old oak tree matches deceit with deceit, and dupes the spirit back into the bottle. The child does not release his prisoner until the spirit vows not to harm the child, but to reward him instead. In addition, the wild man who inhabits a pond in the forest and who has pulled multiple victims to an aqueous death, has his home emptied out in buckets, and is bound and imprisoned, so that all can once more venture into the forest without fear. Those who are abandoned and lost in the woodland also find salvation, as the unhappiness of the lost children is met with the kindliness of an individual in the forest, who offers them food, shelter, and oftentimes treasure.

In *Gossip from The Forest: The Tangled Roots of Our Forests and Fairytales* (2012), Sara Maitland writes that, despite the horrendous circumstances that befall the children in these stories, it is not their intention to caution children never to enter the forest, but rather to warn them of the most sizeable forest monster of all, in the form of carelessness on behalf of the child venturer (102). There are numerous examples of this lack of precaution in the stories of Jakob and Wilhelm Grimm. For instance, in 'Little Red Cap', (see Grimm, 2011, 96-99), when the child enters the forest to deliver cake and wine to her unwell grandma who resides in the wood, both are devoured because she flouts an instruction from her mother not to run off the path. The time she then whiles away on flower collection in the wood provides the wolf with ample opportunity to run to the house and execute his wicked scheme.

The tale of 'Little Snow White' (see Grimm, 2011, 187-194) also contains a child protagonist who declines to listen to instruction in the wild forest. The seven dwarfs warn her

that, because her wicked stepmother will soon discover that she is alive and where she is secreted, when she is alone, she should be sure to let no one into the house. However, when the stepmother appears at the door thrice disguised as a merchant, the child throws caution to the wind due to the allure of the pretty objects. Her failure to heed the words of the dwarfs and to instead succumb to the woman and her wares means that she is almost suffocated with laces and poisoned with a comb, before she dies, for a time, due to her consumption of a poisonous apple. This failure to heed instruction which in turn causes misfortune for the child also occurs in 'Little Brother and Little Sister' (see Grimm, 2011, 39-43). In this tale, the children are maltreated at home and flee and find shelter in a forest. The stepmother pursues the children in secret and bewitches all of the brooks in the forest, so that should the children drink from them, they will be transformed into wild animals. While the sister succeeds at the first two brooks that the children encounter to persuade her brother not to drink the water, for she hears the brooks tell her that whoever drinks of them will become a tiger and a wolf, he selfishly discounts her appeals the third time and is thus transformed into a fawn.

Juxtaposed with these instances of careless children in fairy stories are those in which the child does take measures to ensure their survival in the forest, though with various measures of success. In 'Hansel and Gretel' (see Grimm, 2011, 54-59), the children overhear they are to be abandoned in the thickest part of the forest and will not be able to find their way home. Hansel has the foresight to sneak outside and stuff his coat pockets with white pebbles on the eve of their departure, so he can leave a trail to lead the children home once the full moon has risen to shine on the stones. However, when want strikes anew and the children once more learn they are to be forsaken in the forest, the pebble collection scheme is thwarted, because the door of the house has been locked. Hansel must thus formulate a new plan so the children can evade their fate, and so he crumbles his piece of bread in his pocket

in order to make a new homeward course. This of course does not pan out well, for the crumbs he has strewn about the forest are eaten due to the woodland birds.

Other children who put their faith in trails out of the forest made from edible markers are more fortunate. In 'The Robber Bridegroom' (see Grimm, 2011, 147-149), a father has promised his child to a suitor, who invites his betrothed maiden to visit his home in the dark forest. The child is apprehensive about this venture, for the suitor fills her with a secret horror, and, despite the strewn ashes her betrothed has made a path with for her in the forest, determines to fill her pockets full of peas and lentils so that she can mark her own route home. The house she finds in the midst of the forest is unoccupied, with the exception of an old woman in the cellar who tells the child that she will wed death, for the house is home to a den of murderers who wish to hew her into pieces and cook and eat her. The old woman then conceals the child behind a barrel until the two can flee from the terrible house once its monstrous occupants are asleep. While the wind has made short work of the trail of strewn ashes, for it was intended that the child should never return from the forest, the peas and lentils she scattered have sprouted up, and show them the path home beneath the brilliance of the moon.

In *The Long Earth* (2012), the planet becomes but a singular pearl in a chain of alternate worlds due to the publication of a blueprint for an inexpensive device which enables its maker to click a switch and step into a parallel elsewhere. The children of the world start to disappear, and encounter a world-next-door overrun with forest. This unforeseen appearance of a dense dark forest is something of a shock for children who, seconds prior, were safe and sound in their urban abodes. We can argue that this is because, while plant matter comprises over ninety-nine percent of the biomass of the planet, our routine experience of flora is much constrained (Mancuso and Viola, 2015, 123-124). The flora that

we encounter in our everyday lives is often viewed in a controlled state. Plants are either stuffed into vases or flowerpots, lined up in militarised rows in flowerbeds and along roadsides, or squared off in public parks. In view of our hyper-cultivated world, the children in *The Long Earth* are not accustomed to a ubiquitous and pristine forest, and so perceive it as an alien and perilous environment. Their limited awareness and experience of the uncultivated natural world is evidenced when we read that the closest these children get to a forest in their area is an 'arboretum' (Pratchett and Baxter, 2013, 29). However, this is, of course, a well-tended botanical garden devoted to trees, and is at a far remove from the arboreal wilderness of this stepwise world, in which the forest defies such frontiers that confine and define the limitations upon plant matter.

The dearth of untamed nature in the routine lives of these children is further underscored when one of them, Joshua Valienté, compares the untrammelled forest of this parallel world to 'something out a book' (Pratchett and Baxter, 2013, 27). This reliance on books (dead trees) in order to describe a broad expanse of live trees, because there is no suitable frame of reference in their not-so-vibrant exterior environment, occurs once more in the narrative when one of the other children, Sarah, asks Joshua where they are, and he responds that they are 'somewhere else, I guess. You know. Like Narnia' (Pratchett and Baxter, 2013, 29). These comparisons of the other-world woodland to those found in literature discloses much to the reader about the kind of information these children have acquired in relation to forests—in particular with respect to their real versus fictional contents, and so the children's perceived level of threat, versus the actual extent of their peril. If we briefly examine the forest of Narnia in *The Lion, the Witch, and the Wardrobe* (1950), we find there is much in this tale to instil in children a sense of wonder, such as Aslan or the toffee-that-becomes-a-tree, but also an equal amount to inculcate a fear of the forest. Besides the arch-evil in the form of the White Witch, the woodland is home to a host of other horrible

entities such as ‘wolves’ and ‘ogres’ with ‘monstrous teeth’, a horde of ‘Cruels and Hags and Incubuses, Wraiths, Horrors, Efreets, Sprites, Orknies, Wooses, and Ettins’, and the ‘spirits of evil trees and poisonous plants’ (Lewis, 2015, 138). The fact that there is no true forest in these children’s lives means that stories such as *The Lion, the Witch, and the Wardrobe* or fairy stories that contain a woodland are much more real. If a child is unable to visit an actual forest but has had lots of narrative forays into woodlands that contain such hazards as witches or wolves, it is evident which one will hold the more truth. The fictional forests of popular culture supplant those from the real world.

The sudden transformation from a singular world into a chain of parallel worlds in the novel does lend credence to the notion that what was once the stuff of stories for children could, in fact, be plausible. The newfound existence of a necklace of other-worlds that one can flip a switch and step into mean that the planet is now ‘porous’ (Pratchett and Baxter, 2013, 218). This colander effect subverts perceptions of the world as solid and stable, so the ‘walls of the world’ now appear ultra-thin and hence permeable, as if it is actually possible for a veritable flood of forest monsters from childhood tales to just meander from the fictional realm into the real world (Pratchett and Baxter, 2013, 220). The experience of the children in this elsewhere forest follows the same pattern of event—threat—resolution found in fairy stories about forests. In both cases, one ends up in the woodland (either of their own volition or not), in which there is some form of peril (cannibal witches, voracious wolves, or in this case the sheer alien nature of the environment), before one is rescued due to their intellect or with the aid of a valiant hero.

In the second chapter, the reference to a particular fable, in addition to the mention of the conventional once-upon-a-time introduction to these stories, prompts us to knit a connection between this elsewhere world and the western canon of fairy stories. This is then

embedded in the mind of the reader in the third chapter when we encounter the lost and terrified children of the other-world woodland. In chapter two of *The Long Earth*, Joshua is associated with the kind individual in the fairy tale forest without whom the children who are lost or abandoned would not be able to survive and re-enter the world outside. In a similar vein, for instance, to the huntsman who frees Little Red Cap from the stomach of the wolf, Joshua is characterised as the benevolent saviour who leads the other children out of their *inferno verde*. The police officer Monica Jansson describes Joshua as 'quite the little pied piper' because he returns from his alternate world expedition with the other children in tow (Pratchett and Baxter, 2013, 23). Jansson also tells Joshua that 'once upon a time' he would have been famous for his heroism (Pratchett and Baxter, 2013, 23). The tale of what occurs to the children in this other-world forest can indeed be interpreted as a warped version of 'The Pied Piper of Hamelin' (1842). While the Pied Piper uses his pipe to charm the town rats to pursue him, Joshua uses his intellect to round up the lost children in the forest, and just as the rats respond to the music of the Pied Piper, so the children listen and respond to Joshua when he instructs them to travel towards the voice of one of the other children. There is (of course) one crucial difference between these two tales. The Pied Piper leads the rats into the river to an aqueous death and steals the children away, but Joshua shepherds all the children back to their homes.

Although the forest becomes a landscape of disembodied distressed voices that appeal for assistance in the dark, we must consider that, at odds with the other children, the forest does not faze Joshua. This is because his approach to the forest is one underpinned with logos—a rational or common-sense approach to the woodland. This is in conflict with the other children, whose perception of the forest has been overly shaped and informed by mythos—stories about terrible woodlands full of nefarious entities. These latter children do not proceed with caution into this elsewhere verdure, and are overwhelmed with the fear that

all manner of fictional creatures who could eat them such as ‘orcs’ lie in cover in the dense forest (Pratchett and Baxter, 2013, 43). Joshua, on the other hand, espouses a sensible outlook toward the world-next-door, which is ‘think, don’t panic’, and is well prepared for his first venture into the unknown (Pratchett and Baxter, 2013, 27). Whereas the other children scramble to build their stepper boxes and, in their haste, leave out the crucial switch component, or do not contain the electronic innards and potato power source in a robust shell, Joshua scrutinises the instructions and is slow and meticulous in the construction of his stepper-box. This lack of care that his counterparts exhibit has unfortunate consequences, as these are the children who end up ‘screaming’ and in peril in the bowels of the other-world forest, with wet underwear ‘or worse’ (Pratchett and Baxter, 2013, 25-26). While we can pooh-pooh the notion that this elsewhere forest resembles those familiar to the children from stories, there are hazards in this place that should cause concern. These are, however, rather less fantastical than those such as the orcs etcetera the children envision due to their cultural reference points.

Instead of the death of the child in the forest due to a voracious wolf or a cruel witch, a risk assessment for children in the dark woodland of this parallel world includes ‘tripping over’ and ‘walking into trees’ because said children did not think to come equipped with a torch, or ‘broken’ and ‘speared’ limbs because others decided to use their devices to travel from upper stories and thus plummeted into the forest from above (Pratchett and Baxter, 2013, 43, 32). While there are creatures in the forest to beware of, these are also not of a fictional hue, and instead consist of animals such as ‘lynxes, dog-sized cats that stared at you and ran off in search of easier targets’ (Pratchett and Baxter, 2013, 59). There are also wolves, so the childhood stories do hold up in that respect. However, we learn that ‘mosquitoes were more trouble than wolves’ (Pratchett and Baxter, 2013, 59). This notion of what we have been conditioned to perceive as a woodland hazard (wolves) versus what is in

fact more of a threat in this environment (mosquito bites) resonates with what Maitland writes about probable versus improbable forest perils that children are warned about in popular culture, and in fairy stories in particular. Maitland underlines the rather redundant nature of fairy tale forest warnings, especially in the modern epoch. For instance, while it is doubtful that a child will become the feast of wolves or witches—two of the main preoccupations of woodland fairy stories, there are no tales that warn children not to 'eat fungi or unidentified berries', which Maitland points out is 'something that children will regularly do' (2013, 341). In *The Long Earth*, the predominant perils that the children encounter in the other-world woodland can thus be quashed with preparedness, of which Joshua is the embodiment. So long as one comes equipped with prudence and a few extras such as mosquito repellent, one should return home unscathed.

In the second chapter of *The Three-Body Problem*, the description of the felled Dahurian larch tree as the slain corpse of a fabled 'giant' also draws on the western cultural tradition of a hostile opposition between the woodland and human civilisation that has existed since its inception—a convention that has attempted to rationalise the maltreatment of arboreal loci at the hands and chainsaws of humankind (Liu, 2016, 19). This particular comparison, in which the woodland is associated with one of the conventional enemies found in fairy stories, as in 'Jack and the Beanstalk' (1734), underscores the influence of popular culture on our perception and valorisation of the natural world. It reminds us that, in the collective conscience of humankind, the forest is at once a monster-filled and animate threat that should thus be vanquished. In addition, it reinforces the earlier point that our discourse about the natural environment is loaded. When we continue to associate the forest and its endemic flora and fauna with malevolent forces, it conditions us to validate their extermination (see Mitts-Smith, 2010, 16).

It is important to mention the paradox that it is the tree, and by extension the forest, that is associated with the domain of the monstrous, despite the fact that it is not the creature with axe and saw in hand. This recalls a similar such instance in *Harry Potter and the Chamber of Secrets* (1998), in which the tree known as the Whomping Willow is represented as another manifestation of the malevolent arboreal, despite the fact that it is attacked first when a flying car crashes into its crown. However, while the Willow tree strikes back at its human assailants, the same cannot be said for the Dahurian larch tree in *The Three-Body Problem*, which, like the rest of its woodland counterparts, 'acts as trees ought by submitting quiescently to human depredation' (Chez, 2016, 86). Thus, the name it is ascribed in the narrative does not quite fit, for unlike the giants that we encounter in fairy stories, the Dahurian larch does not retaliate. There is a certain irony that giants in popular culture tend to wreak devastation and consume people, but here it is humankind that has decimated the colossal denizens of the forest. In this manner, *The Three-Body Problem* problematises our conventional approach to the forest in a stark reversalism that underlines that the monster hails from without, as opposed to within the woodland.

There is one child in *The Long Earth* who does not conform to this pattern of children whose fear of the forest stems from their recollection of the voracious wolves and wicked witches of childhood stories. For Sarah, the trees themselves constitute an animate (and sexual) threat. Elizabeth Parker writes that the concept that we should beware of the woodland itself is not a new phenomenon in popular culture, but that it is much less prevalent than the motif of the innumerable hazards that the forest could conceal (2020, 71). Parker writes that the most infamous tree attack in popular culture is in the film *The Evil Dead* (1981), in which a tree defiles a woman in the forest, in an extremification of the tactile potential of the arboreal (2020, 107). However, the idea that trees could commit acts of sexual violence is also indicated in a much earlier film, *Snow White* (1937), in which the

vulnerable princess must wrench herself free from the ‘tentacular clutches’ of the forest (Parker, 2020, 108).

In *The Long Cosmos* (2016), we discover that Sarah, one of the children who becomes lost in the other-world forest, was placed in a home for children because she was the victim of child sexual abuse. We read that she ‘had already survived nightmares, which was why she had ended up in the Home on Allied Drive in the first place’ (Pratchett and Baxter, 2017, 34). When Sarah then twists some wires and is transported from the protective environment of the home to a darkened elsewhere forest, what we witness is a sudden, violent return of her repressed trauma. This is evident when we read that she ‘felt as if all those nightmares had come back for her once more. Hands reaching for her in the night… She’d lost it’ (Pratchett and Baxter, 2017, 34). While these quotations depict the forest as a terrible place for Sarah due to its metamorphosis into a locus of revisited trauma, it must be clarified that this other-world forest is not characterised as a theatre of reanimated traumatic memories because its arboreal inhabitants violate the constraints of plant life. The trees themselves are in fact sessile—which is not the case in all of the parallel worlds.

It is rather the quotidian movements of the limbs of the trees that evoke fear, as the branches and leaves produce a tendrilled network of hands and arms that outstretch and touch human skin. The forest does not cause intentional material or emotional harm to Sarah when its branches and leaves make contact with her. The fact that it does so nonetheless is a reminder that a significant number of victims of childhood sexual abuse end up with haphephobia, which is a fear of touch (see Dorais, 2005, 84). This fear could also be the reason Sarah later becomes ‘Sister John’, for her relationship with God is immaterial (Pratchett and Baxter, 2017, 34). There are certain parallels that we can draw between the behaviour of the forest and her abuser which substantiate her discomfort in this environment.

For Sarah, both vegetal matter and human partake in invasive movements which violate her corporeal boundaries. The trees appear to reach for Sarah in the darkness of the forest, much like the unwarranted hands that come towards her in the darkness of her abusive childhood home. The darkness and quietude of the forest also recreate the atmosphere of isolation from the rest of the world Sarah must have experienced at that terrible time. To be a child surrounded in all directions with tactile trees that tower over them, must also appear as if one has entered into an entire world of potential assailants that one cannot escape from. Harrison writes that 'forests have the psychological effect of evoking memories from the past' (1993, 156). While for the other children the forest recalls memories of the monstrous woodlands of bedtime stories, for Sarah these are much more terrible recollections. In a similar manner to Marcel Proust, for whom 'the taste of a madeleine brought back to life a lost era of his childhood', for Sarah in this tale, the tentacular nature of the forest recalls an abhorrent past of childhood sexual abuse. She relives the trauma a thousand times over with the touch of each leaf or branch (Harrison, 1993).

4.3: From the Malevolent Forest to the Wondrous Woodland: Parallel Woods-Between-the-War in *The Long Earth* (2012) and the Fiction of J. R. R. Tolkien and C. S. Lewis

In *The Long Earth*, the representation of the forest is twofold. The forest is depicted as a dreadful environment from the perspective of the disappeared children, and as a place of solace and protection—a sanctum from the terrible world without. The first chapter of the narrative transports its readers back to 1917, in which we are introduced to Private Percy, as he awakens in a 'forest glade' replete with 'birdsong' (Pratchett and Baxter, 2013, 9). This is an environment that is at a far remove from his most recent quarters—the mud, blood, and blasted landscape of the Western Front—a truth reinforced in this chapter due to the repeated

contrast between the serene elements of the forest and the horrors of modern warfare. The stark elements of the battlefield, such as the 'hell of noise and screams and mud', and the miasma of 'cordite, hot oil, burned flesh and the stink of unwashed men', are supplanted in the forest with more palatable alternatives. For instance, we learn that there was 'no noise except the birdsong in the trees', and the scent of 'fragrant grass' (Pratchett and Baxter, 2013, 9). We read that Percy was 'worried, in a concussed kind of way, why he was lying in damp though fragrant grass and not on his bedroll' (Pratchett and Baxter, 2013, 9).

This dramatic transition to a place of quietude and respite prompts him to speculate whether he has died as a result of the latest 'fearsome bombardment', and he concludes that 'if he was dead then this would do for a heaven' (Pratchett and Baxter, 2013, 9). These excerpts underscore the concept of the forest as a dream-like or unreal space that he is not certain actually exists. To Percy, the forest has materialised—or so it seems—out of nowhere. It is a space that has, to all outward appearances, revealed its existence in a moment of need, and one that provides a welcome retreat from an otherwise traumatic and abject environment. This evokes similar other-worldly sanctuaries for readers, such as the wardrobe swaddled Narnia, or the Room of Requirement found (on occasion) in the *Harry Potter* universe—the door to which flashes whimsically in and out of existence in the walls of Hogwarts. Much as readers do not expect to encounter a dense forest in the space ordinarily occupied by the back panel of a wardrobe (though we check them all anyway—to be sure), so it is that Percy does not expect to find himself teleported to just such a place from the pockmarked moonscape that is World War One France.

The unreal nature of this woodland, and in particular its sudden apparition at a point of absolute horror, leads to a recollection of the creative practice of the 'paracosm' (Cohen and MacKeith, 1991). This is a dissociative phenomenon often associated with childhood—

but which can also extend to or arise in adulthood—in which an individual will invent a detailed pretend fantastical world which is then sustained over an extended period of time. The invention of such make-believe worlds has been interpreted as a creative endeavour to withstand some form of trauma (see Cohen, 1996). Since we do not know at this initial point in the narrative about the new-found potential for humankind to disappear into a multitude of parallel worlds, we cannot determine whether this elsewhere forest is an internal world spawned due to the atrocities of war, or whether the woodland has, de facto, materialised as a portal to a superior world without the viciousness of humankind. If the forest did, however, assume the accolade of paracosm as trauma-related mechanism to weather the war, this character would not be the first to invent such a place in which one could evade the terrible nature of the real world.

For instance, Nora Alfaiz identifies both J. R. R. Tolkien and C. S. Lewis as paracosmists—though she does not use this term *per se*—whose rationales for the creation of their worlds derived from their time served in the Great War (2020). Components of their real-world wartime experience are sewn into their fiction. So too are sites within their fabricated worlds in which one can escape from all of the dire circumstances of the fictional world without—an out not afforded in the real-world arena of war. In each instance, the locus of solace is the woodland, in a stark reversalism of the western cultural tradition of the forest as monstrous. Just as Percy in *The Long Earth* finds himself in a safe arboreal landscape far from the blood and mud of the battlefield of World War One France, so in *The Lord of the Rings: The Fellowship of the Ring* (1954), the fellowship find respite from the war of the ring in the forest of Lothlórien. In *The Chronicles of Narnia*: *The Magician's Nephew* (1955), the children have no need to fear the witch and her quest to devastate and conquer in the Wood between the Worlds.

In *The Long Earth* the trees exist in this elsewhere forest in an untouched state, with their trunks not shattered to pieces like their Western Front counterparts. The predominant reason put forward for this is that Percy believes he is either in a dreamscape. Or, that he has transcended the war-torn world of mortals. We see his puzzlement when we read, 'when had he last seen a tree that was even vaguely in the shape of a tree, let alone a tree with all its leaves, a tree not smashed to splinters by the shelling? And yet here were trees, lots of trees, a forest of trees' (Pratchett and Baxter, 2013, 9-10). This vibrant population of trees is a world apart from the realities of tree-kind confronted in environments of war. The First World War saw trees 'blasted out of existence' and forests on the Western Front were reduced to little more than 'acres of stumps' (Garth, 2004, 164; Brantz, 2009, 82). Woods suffered a substantial number of casualties in offensives such as the Battle of the Somme, and were transformed into wildernesses of 'toppled trunks and black stumps, hung with rags of bark' (Garth, 2004, 191). Dorothee Brantz writes that, in France alone, 'the French Forestry Service estimated that 350,000 hectares of forest had been destroyed during the war, an amount that would have supplied the tree harvest for the next sixty years' (2009, 82).

In their vivid depiction of mutilated trees, Pratchett and Baxter remind readers of the all-too-often overlooked fact that battlegrounds are also sites peppered with multiple non-human victims of war. This more-than-human cost of war is a truth also illuminated in the fiction of J. R. R. Tolkien, who, like Private Percy, also served in France in the First World War. The events, or rather, to use his words, the 'animal horror of the life of active service on the earth' he experienced in the Great War had a crucial impact on the conception of his fantastical world of Middle-earth—a landscape that enabled him to respond to his traumatic wartime experiences (Carpenter, 2006, 72). The destruction of the environment in the name of war is one of the predominant concerns found in his work. In part two of his epic book, *The Lord of the Rings: The Two Towers* (1954), in which Frodo and Sam must continue their

quest south in order to put an end to the ring while the war between fair and foul individuals still wages about them, the Orc soldiers of the Dark Lord Sauron leave their non-human victims (the ones that cannot be eaten or have not been burned to ash) strewn about the landscape in a desecrated state. The violent scenes of 'trees hewn down wantonly and left to die, with evil runes or the fell sign of the Eye cut in rude strokes on their bark' are—alas—not unusual on their adventure (Tolkien, 2001, 319).

While the diaries, correspondence, and memoirs of soldiers from the First World War 'are full of references to their surroundings', Brantz argues that this conflicts with 'most of the secondary literature about World War I', which she states 'fails to consider the role of the environment in trench warfare' (2009, 70). Instead, Brantz observes that historical studies of the war 'treat the environment as merely the backdrop against which the drama of physical and psychological attrition unfolded'—a historiography in which trees are just the smashed scenery of war and not another toll of sentient victims (2009, 70). In *The Lord of The Rings: The Two Towers*, Treebeard, an ancient tree-like creature from the species known as Ents, who perform the part of tree-shepherds or defenders of the forest, vocalises this lack of consideration for the more-than-human world in times of war. When the Hobbits Merry and Pippin enquire as to what side of the war Treebeard situates himself on, he replies 'I am not altogether on anybody's *side*, because nobody is altogether on my *side*, if you understand me: nobody cares for the woods as I care for them, not even Elves nowadays' (Tolkien, 2001, 83). Although Brantz holds that the historical studies of the First World War are rather devoid of sentiment for the acts of ecocide committed in this period, such critiques are juxtaposed with accounts from a number of soldiers who considered trees and forests as benevolent and, most importantly, alive, and perceptive, comrades-in-arms. For instance, Ernst Toller, a German war volunteer on the Western Front, affirms the similitude of trees and soldiers in his remark that 'a forest is a Volk. A shot-up forest is an assassinated Volk' (Spalek and Frühwald, 1978,

64). In a similar vein, another German troop writes that ‘the fate of this forest is linked and interwoven with my own at the deepest level. Not only were the woods my comrade but also my protection, a shield that wards off the lead and iron hurled at me’ (quoted in Brantz, 2009, 84).

This kindred relationship between trees and soldiers rationalises the lack of unease that Percy experiences in *The Long Earth* when he finds himself ‘in woods where woods shouldn’t be’ (Pratchett and Baxter, 2013, 10). In contrast to the hostile and war-torn environment of subtraction external to the forest in which humans, plants, animals, and even the earth beneath them can disappear in a blink, the woods are a place of gracious bestowal, of protection and sustenance, in which life abounds. The vibrant nature of the forest becomes more apparent when Percy gazes at stars ‘more brilliant than he had ever seen’, and riverbanks full of crayfish that are more sizable, plentiful, and ‘juicy’ than those that he has encountered in the world without (Pratchett and Baxter, 2013, 11). In addition to these woodland bounties, the forest also provides a safe space in which he can succumb to sleep because he knows that, unlike humans and their instruments of war, ‘trees had never tried to kill him’ (Pratchett and Baxter, 2013, 10). In this scenario, in opposition to the deep-rooted western cultural tradition of malevolent woods and far from the perceived ‘fee-fi-fo-fums’ of the ‘giant’ tree in *The Three-Body Problem* that sounded its death knell, trees are friends and not foes. Rather, it is the world external to the forest that is painted as monstrous. The otherworld forest is the sole reprieve from the real-world hellscape of war.

This representation of the forest as the one oasis to be found in an otherwise malevolent environment also occurs in the fantastical world of Middle-earth. Here, outside the perimeter of the forests, with the exception of small pockets of amicable civilisation dotted across the map, lies a barren wasteland in which death and desolation are the lone

inhabitants. The nine characters that comprise the Fellowship of the Ring encounter four notable forests in their expedition from The Shire to Mordor. Each of them offers a reprieve from a landscape that is otherwise blasted due to the resource demands and toils of war and populated with orcs and wolves and a host of other creatures under the hostile thumb—and, of course, ever-watchful Eye—of the Dark Lord Sauron. In part one of the narrative, *The Lord of the Rings: The Fellowship of the Ring* (1954), the wicked wizard Saruman—a servant of Sauron who wanted to procure the One Ring for himself—traps his benevolent counterpart Gandalf in Isengard atop the tower of Orthanc. From his prison, Gandalf is able to look across the valley and witness the extent to which the landscape has been defiled due to the atrocities of warfare. After his escape, he tells his companions that 'whereas it had once been green and fair, it was now filled with pits and forges', a scene that all the more evokes a sentiment of disquietude for readers and fellowship alike, because this is just the result of groundwork—and the war of the ring has not yet come to pass (Tolkien, 2003, 341).

The narrative further builds on this environmental ruin in the second part of the book, *The Lord of the Rings: The Two Towers* (1954), in which the character of Treebeard, an inhabitant of Fangorn Forest close to Isengard, must also bear witness to the devastation that has been inflicted on the landscape in the name of war by the 'tree-killer' Saruman and his battalion of 'orc-axes' (Tolkien, 2001, 208). Treebeard tells his Hobbit companions Pippin and Merry that Saruman 'does not care for living things, except as far as they serve him for the moment', and that as such, 'down on the borders they are felling trees – good trees. Some of the trees they just cut down and leave to rot – orc mischief that; but most are hewn up and carried off to feed the fires of Orthanc' (Tolkien, 2001, 84-85). This wanton destruction is much more of an affront for Treebeard than Gandalf, however, as he laments that 'many of those trees were my friends, creatures I had known from nut and acorn; many had voices of

their own that are lost forever now. And there are wastes of stump and bramble where once there were singing groves' (Tolkien, 2001, 85).

While this desolate zone lies to the western side of Middle-earth, the further south and nearer to the jaws of Mordor that the fellowship travels, the more of a lifeless husk the landscape becomes. The fellowship eventually crosses into what are known as 'the Brown lands', an area of 'brown and withered' slopes that the narrator describes appear 'as if fire had passed over them, leaving no living blade of green: an unfriendly waste without even a broken tree or a bold stone to relieve the emptiness' (Tolkien, 2003, 499). Treebeard elucidates that these lands were once the home of the Entwives, who lived and tended to gardens there until these too became casualties of the wars of others, and their caretakers vanished. We discover that when Treebeard and the others went to visit the Entwives 'in the time of the war between Sauron and the Men of the Sea', they found only 'a desert: it was all burned and uprooted, for war had passed over it. But the Entwives were not there' (Tolkien, 2001, 88). Treebeard tells the Hobbits that 'if Sauron of old destroyed the gardens, the Enemy today seems likely to wither all the woods', and thus there is an inherent fear that the Brown Lands will spread elsewhere if there is no counterattack—or should Frodo fail in his quest (Tolkien, 2001, 89).

The blemishes of war on the topography of Middle-earth become even more apparent in the final chapter of *The Fellowship* from where Frodo sits on the 'Seat of Seeing, on Amon Hen, the Hill of the Eye of the Men of Númenor' (Tolkien, 2003, 526). We read that 'everywhere he looked he saw the signs of war. The Misty Mountains were crawling like anthills: orcs were issuing out of a thousand holes. Under the boughs of Mirkwood there was deadly strife of Elves and Men and fell beasts' (Tolkien, 2003, 526). In addition to these instances of a land that appears quite literally alive with conflict, Frodo also sees that 'the

land of the Beornings was aflame; a cloud was over Moria; smoke rose on the borders of Lórien. Horsemen were galloping on the grass of Rohan; wolves poured from Isengard. From the havens of Harad ships of war put out to sea', and that 'out of the East Men were moving endlessly: swordsmen, spearmen, bowmen upon horses, chariots of chieftains and laden wains. All the power of the Dark Lord was in motion' (Tolkien, 2003, 526). When Frodo and Sam later depart from the rest of the fellowship in *The Two Towers* to take their burden further south after Boromir tries to corner Frodo and take the ring for himself, the two then must traverse further environmental hardships such as the Dead Marshes.

The Dead Marshes are a bleak landscape in which the Hobbits must trust the treacherous creature Gollum to lead them to the other side and to the worst places of all—Mordor and Mount Doom. It is an eerie land choked with 'thick mists' and carpeted with slime and 'dark and noisome pools' (Tolkien, 2001, 284-285). The characters must tread through this obstacle course of 'pools, and soft mires, and winding half-strangled water-courses' (Tolkien, 2001, 286). In the heart of the marshes below their feet, to their horror, is a world of mud and water and corpses. Frodo remarks that there are 'pale faces, deep under the dark water. I saw them: grim faces and evil, and noble faces and sad. Many faces proud and fair, and weeds in their silver hair. But all foul, all rotting, all dead' (Tolkien, 2001, 288). Gollum explains that this was once the site of 'a great battle. Tall Men with long swords, and terrible Elves, and Orcses shrieking. They fought on the plain for days and months at the Black Gates. But the Marshes have grown since then, swallowed up the graves; always creeping, creeping' (Tolkien, 2001, 288-289). This depiction of the marshland as an insatiable monster consuming all that lies in its path resonates with reports of the battlefields of the Western Front, in which the mud was compared to 'an "enormous octopus" that swallowed men up' (Brantz, 2009, 79). An article from the French trench newspaper *Le Bochophage* in March 1917 reinforces this perception of the muddied human-made wetlands

of war as another foe that each soldier must be aware of, as ‘mud throws its poisonous slobber out at him, closes around him, buries him. For men die of mud, as they die of bullets, but more horribly. Mud is where men sink and—what is worse, where their souls sink’ (Smith, Audoin-Rouzeau, and Becker, 2003, 89).

In a letter of 31 December 1960, Tolkien emphasises the influence that the First World War had on his representation of the Dead Marshes. He writes that both the marshes and the approaches to Mordor ‘owe something to Northern France after the Battle of the Somme’ (Tolkien in Carpenter, 2006, 303). In their preservation of the war dead in which friends and enemies lie shoulder to shoulder, the Dead Marshes are a raw reminder of the true cost of war—without the distance afforded by the slow march of time, the ‘do not touch’ of museum exhibitions boxed off behind ropes, and the rows upon rows of concrete headstones and monuments. This is a rather more literal face-to-face encounter with the consequences of war—a still of a landscape that has been stripped of life and has instead been seeded with the countenance of death. It is implicit that, should Frodo fail in his quest, more of Middle-earth will fall victim to the slow but vast maw of the marshes. The Land of Shadow that encompasses Mordor is the southern-most ward of this vast ecocidal disaster zone, one that marks a transition from war-torn swamp hellscape to war-torn desert hellscape. The narrator states that ‘here nothing lived, not even the leprous growths that feed on rottenness. The gasping pools were choked with ash and crawling muds, sickly white and grey, as if the mountains had vomited the filth of their entrails upon the lands about’ (Tolkien, 2001, 293). This is an area that the narrative depicts as irrecoverable, ‘unless the Great Sea should enter in and wash it with oblivion’ (Tolkien, 2001, 294). It has been plundered to the brink of death for resources for use in war until all that remains is a ‘lasting monument to the dark labour of its slaves that should endure when all their purposes were made void’ (Tolkien, 2001, 293). That is to say ‘the great heaps of slag and broken rock and blasted earth, the vomit of the

maggot-folk of Mordor' (Tolkien, 2001, 189). These are the bare-bones of the earth that have been deemed useless.

While this broad panorama of wickedness and environmental destruction dominates much of the terrain of Middle-earth in the narrative, this world of horrors is at odds with the Elven Forest of Lothlórien, a beautiful island that offers a sliver of quietude and enchantment within this sea of endless perils. Lothlórien is also referred to as 'the Golden Wood' due to its palatial resplendence and, as such, as Matthew Dickerson and Jonathan Evans write, it 'exhibits the positive results of careful preservation and stewardship by the Elves under Celeborn and Galadriel' (Tolkien, 2003, 442; 2011, 133). Legolas tells the rest of the fellowship that 'there are no trees like the trees of that land. For in the autumn their leaves fall not, but turn to gold. Not till spring comes and the new green ones open do they fall, and then the boughs are laden with yellow flowers' (Tolkien, 2003, 438). This quotation underlines that the trees of Lothlórien, which are a species called 'mallorn-trees', are held in considerable respect for their uniqueness, resilience, and for their richness (Tolkien, 2003, 457).

In addition to the other Elven realm of Rivendell, the deep woodland of Lothlórien is one of the few sanctuaries that the tendrils of war and loss and sadness have not touched, for 'there is a secret power here that holds evil from the land' (Tolkien, 2003, 443). This representation of the forest as a place that works to exclude malevolence also resonates with the depiction of forests found in book six of *The Chronicles of Narnia* series, *The Magician's Nephew* (1955). In this narrative two children named Polly and Digory are magicked away from their London home in the real world to an elsewhere forest known as the 'Wood between the Worlds' (Lewis, 2015, 37). This forest acts as a form of station between worlds, and the pools of water that freckle the forest floor act as shuttles to and from other realms.

The children jump into one of the pools in this in-between forest and enter the world of Charn. This is a ruined environment in which a wicked witch named Jadis latches onto Polly before the children are able to disappear and return to the sanctuary of the woodland.

However, the forest rejects this evil that has been cast into its midst, as Jadis starts to perish once she has crossed its threshold. The narrator states that the witch 'was much paler than she had been; so pale that hardly any of her beauty was left. And she was stooped and seemed to be finding it hard to breathe, as if the air of that place stifled her' (Lewis, 2015, 65-66). When the children attempt to evade Jadis in the forest and return to their own world, she attaches herself to them once more and wreaks havoc in their world on her arrival. This path of destruction leads Digory to ponder if he can return her to the wood, and he muses, 'will she go all faint again there? Was that something the place does to her, or was it only the shock of being pulled out of her own world?' (Lewis, 2015, 79). The narrative underlines the fact that this is the work of the forest in the sheer difference of experience between the children and Jadis. The children, who are also pulled from their own world, find the woods to be a vibrant place of contentment that is 'as rich as plumcake' (Lewis, 2015, 32).

Yet when Jadis enters, she becomes 'deadly sick' and implores the children 'take me with you. You cannot mean to leave me in this horrible place. It is killing me', evidence that their experience is dependent on the trees' determination of either a benevolent or malevolent heart in their visitors (Lewis, 2015, 90, 66). Once the children take the witch into the virtuous world of Narnia, in a failed attempt to remove her to Charn, which exists no more because its sun has died, Aslan also relies upon the power of trees, in this case a singular silver apple tree, to protect the realm from the witch and other evils. He announces to the citizens of Narnia, 'let it be your first care to guard this Tree, for it is your Shield', and declares that while this tree flourishes, the witch 'will never come down into Narnia. She dare not come

within a hundred miles of the Tree, for its smell, which is joy and life and health to you, is death and horror and despair to her' (Lewis, 2015, 161). These examples emphasise that friendly trees and forests do exist. We just require a little more help to see the 'good' forests through the culturally ingrained 'evil' trees.

The further that Frodo and the rest of the Fellowship of the Ring wander into Lothlórien, the more the narrative underlines the concept of the forest as a timeless utopian 'Other-world' that remains unclouded with atrocities (Tolkien, 2001, 41). There is an element of the faerie written plain on this forest due to the wonder that it instils in those who are permitted to cross its threshold. We read that when Frodo enters the heart of Lothlórien, that it appeared 'that he had stepped over a bridge of time into a corner of the Elder Days, and was now walking in a world that was no more' (Tolkien, 2003, 458). The forest evokes the realm of the faerie because it acts as a portal to what Tolkien defines as 'Other Time'—a time 'outside our own' in which the marvels of the natural world still flourish because they have been steeped in enchantment and have thus not been blasted out of existence with the infiltration of war in the world without (2001, 32). The narrator details that 'in Lórien the ancient things still lived on in the waking world. Evil had been seen here or there, sorrow had been known; the Elves feared and distrusted the world outside: wolves were howling on the wood's borders: but on the land of Lórien no shadow lay' (Tolkien, 2003, 458). Instead, there is the sense that this faerie-esque forest is a place of eternal life and innate virtue that tolerates no evil and instead uplifts the hearts of all those who enter it.

The Elf named Haldir tells Frodo and his companions that 'here ever bloom the winter flowers in the unfading grass: the yellow *elanor*, and the pale *niphredil*' (Tolkien, 2003, 459). The narrative further depicts the forest as a pristine piece in an environmental puzzle of rot and death when we read that 'no blemish or sickness or deformity could be seen in anything

that grew upon the earth. On the land of Lórien there was no stain' (Tolkien, 2003, 460). The interaction between the Elves and the forestscape connotes a sense of oneness or harmonious coexistence that Susan Jeffers defines as a 'power with' relationship between a place and its inhabitants (2014, 16). This union between Elves and earth is most apparent when Sam observes that the Elves 'seem to belong here, more even than Hobbits do in the Shire. Whether they've made the land, or the land's made them, it's hard to say' (Tolkien, 2003, 473). These blurred boundaries between the Elves and the forest are also underscored in the names that are attributed to the Elves. Tolkien christens the Elves of Lothlórien 'the Galadhrim' or 'the Tree-people' as it is their custom to reside in the tree-tops on platforms known as '*flets*' or '*telain*' (Tolkien, 2003, 447, 449). Therefore, as Dickerson and Evans point out, 'their own name emphasises their particular horticultural devotion' (2011, 107).

The Elves' valorisation of the trees and their love and respect for the wider natural world for its own sake mean that this a forest that can thrive without fear of axe or foe. Legolas states that 'deep in their forest the trees are very great. The people of the woods did not delve in the ground like Dwarves, nor build strong places of stone before the Shadow came' (Tolkien, 2003, 447). Rather, Jeffers writes that 'the Elves gain "power with" their places by appreciating the inherent beauty of the things they have worked to preserve as a group over time' (2014, 43). Dickerson and Evans note that 'in terms of aesthetics, the Elves are most sharply contrasted with the Dwarves, who value the environment primarily as a source of fuel, building materials, and precious gems and metals' (2011, 101). Juxtaposed with other races of Middle-earth such as the Dwarves or Men that leave definite imprints on the environment in the creation of their abodes because they clear a path through it, the Elves of Lothlórien build in and around their forestscape with as little disturbance to it as possible.

Frodo and his companions must wrestle with the temptation to remain in the paradisical faerie-esque forest of Lothlórien forever, due to its possession of a restorative power not found elsewhere in their quest. Beneath the protective embrace of its mallorn boughs, the urgent and onerous nature of their trek to Mordor dissipates, and the full extent of their time spent in this woodland is unspecified—a factor that further contributes to its air of enchantment. The narrator states that 'they remained some days in Lothlórien, so far as they could tell or remember' (Tolkien, 2003, 470). Of their time spent in Lothlórien, we read that 'it seemed to them that they did little but eat and drink and rest, and walk among the trees; and it was enough' (Tolkien, 2003, 470-471). The experiences and sentiments of the Fellowship in this woodland reflect those of the other characters discussed in this subsection from *The Long Earth* and *The Chronicles of Narnia*, as all find peace from their troubles in their respective benevolent forests.

In *The Magician's Nephew*, the character of Polly observes that the Wood between the Worlds possesses a 'dreamy' atmosphere that almost lulls the children to sleep, and she tells Digory that 'if we once give into it we shall just lie down and drowse for ever and ever' (Lewis, 2015, 34). Both Sam and Digory perceive their forests in much the same way. While in the Wood between the Worlds Digory feels 'as if one had always been in that place and never been bored although nothing had ever happened', Sam tells Frodo in Lothlórien that 'it's wonderfully quiet here. Nothing seems to be going on, and nobody seems to want it to', and he admits that he does not want to leave because 'I've never heard of a better land than this. It's like being at home and on a holiday at the same time' (Lewis, 2015, 32; Tolkien, 2003, 473-474). This reluctance to leave is not unfounded. We can argue that the benevolent forests in each of these stories are a rational response that manifests from a desire to escape from the strife of the real world into one that cannot be touched, and a belief that a better

world is out there in the ether somewhere, or at least able to be conceptualised in our dreams, as the planet collapses around us.

Tolkien argues that the desire to remain, either physically or mentally, in such a place should not be the subject of childish derision, for to escape 'is evidently as a rule very practical, and may even be heroic. In real life it is difficult to blame it, unless it fails' (2001, 60). To the critics that scorn this desire to leave the real world in the dust awhile, Tolkien writes that 'you have only to say "the land you love is doomed" to excuse any treachery, indeed to glorify it' (2001, 61). In a reflection on his own taste for the world of faerie as a place of consolation and escape, Tolkien comments that this 'was wakened by philology on the threshold of manhood, and quickened to full life by war' (2001, 42). While Frodo and the rest of the Fellowship do, in due course, leave their forest haven and return to the dark and leafless route that lies ahead, in order to fulfil their quest, and restore the balance of good and evil to the realm of Middle-earth after a protracted and violent war, we cannot ascribe blame to Percy in *The Long Earth* for remaining in his parallel Earth forest sanctuary for 'much of the rest of his life' (Pratchett and Baxter, 2013, 176). It is not until the war of his world, the era of 'man disassembling man with high explosives' is far in the past that he returns to real world France (Pratchett and Baxter, 2013, 177). The benevolent forests possess a firm hold on the hearts of those who cross their thresholds.

4.4: The Transition from the Malevolent Forest in Popular Culture to the Woodland-in-Peril

There has been a substantial shift in the discourse about forests which should steer us in a different direction from the time-worn motif of the wicked woodland. The convention of the forest as either monster-filled or as animate monster has, of late, been supplanted with more realistic depictions, in which the lone menace in the woodland derives from humankind, and

it is the endemic flora and fauna who are victimised. This subversion of the traditional depiction of the malevolent forest has started to materialise in a broad spectrum of literature, from stories for children like *The Little Red Wolf* by Amélie Fléchais (2014), to seminal works of environmental science such as *Silent Spring* by Rachel Carson (1962). *The Little Red Wolf* is an eco-conscious reinterpretation of the classic fable, *Little Red Riding Hood.* We read that, once upon a time, there lived three wolves in the trunk of a tree in the forest, a mother and father, and their pup, called Little Red Wolf. The mother wolf asks her pup to deliver a rabbit to his grandma, for she has lost her teeth and cannot hunt for herself. Prior to his errand, his mother warns him to avoid the part of the forest known as 'dead wood', because it is the home of an abhorrent huntsman and his child who detest wolves (Fléchais, 2017, 8). The little wolf does not take heed of these words of caution, and instead abandons the trail to pursue beetles and mice, and chase after pollen.

It is a while before he recalls the reason for his forest venture, at which point he cannot relocate the trail. In his hubris he wanders onwards, but succumbs to his stomach and eats the rabbit. The little wolf then slumps on the forest floor and cries due to his predicament, lost and minus the food that has been entrusted to him. It is at this point that a child encounters the pup, and while he remembers that he has always been warned to avoid humankind, her small stature and apparent concern for his welfare lead him to conclude that she must be a benevolent aberration. When the little wolf relates his unfortunate circumstances to the child, she tells him to come to her home where she will bestow on him another rabbit. It is important to note the difference in the illustration format the closer the two become to the human household. The depiction of the forest up until this point in the fable is of a vibrant network of enormous trees with lots of different species of flora and fauna in residence. The forest then adopts a much different character, however, with scant verdure to be observed as the trees become thinner and stumps abound. The previous riot of

warm colour is superseded with a faded iteration of its former self. The plants that we do notice are of a translucent nature, as if we should expect them to wink out of existence at any moment. There is also a proliferation of animal bones on the forest floor, which were not a feature of the rest of the forest. This further indicates that this part of the forest is a bleak wasteland in which flora and fauna cannot survive. There are three owls perched on the hacked remains of one of the trees that accent this mournful representation of the 'dead wood'.

The home of the child is also surrounded with death, for there is not an intact tree to be found nearby, and the pelts of multiple dead wolves are suspended from lines and hooks or are used for ornamentation. The child tells the little wolf, who cannot at first see these atrocities, for the interior of the house is concealed in darkness, that the rabbit is at the far end of the house. The child then proceeds to shove the pup into a trap, in which she tells him, through the medium of song, that since the wolves caused the death of her mother, both she and her father have responded in kind, because in their view, all wolves deserve to be annihilated. At this point her father returns and fires his rifle at the little wolf, but there is a clamour, and after a spell of tumultuous darkness, the pup observes that, all of a sudden, his own father has arrived, and his tormenters have been secured with rope. The wolves then depart from that desolate part of the forest and the little wolf hums the tune of the child en route home. When his father asks how he knows this tune, the pup tells him about the child and proceeds to perform it in full. The father tells him that he, too, is familiar with this tune, but that he recalls a different version.

In his rendition, the woman who lived in the forest was not the victim of a wolf attack—she was, in fact, benevolent toward the wolves, and would weave them brilliant cloaks which she would deliver to them each full moon, after which, all would dance merrily

together in the forest. However, when the huntsman could not find his wife one night, he dreaded the worst and went into the forest with his rifle to search for her. When he found her surrounded with wolves, fear overcame wisdom and he let his rifle speak—but in his zealousness to exterminate the wolves—he shot and killed his wife. *The Little Red Wolf* heralds a new dawn in our cultural approach to the forest because of its inversion of what we have been conditioned to expect of the woodland. It is not voracious wolves or cruel witches that one must fear. Rather, we can assert that 'the savagery that once traditionally belonged to the forests now lurks in the hearts of men' (Harrison, 1993, 100). What we have in this re-told tale is a reversal of who is a threat to whom, for the forest is the victim of a monstrous humankind intent on its consumption and destruction. The terrible creatures of the forest have human rather than bestial or mythical countenances.

Meanwhile, in Chapter One of *Silent Spring*, 'A Fable for Tomorrow', what we encounter is another revised version of the fairy story forest that subtracts our collective forest phobia and substitutes it for fear for the forest. This fable underscores that there is, in fact, a peril in the forest, but it does not derive from flora or fauna within the woodland—but rather from without. It is important to note that, as with *The Little Red Wolf*, rather than warning readers of a threat that either once existed (wolves) or never existed (orcs) in the forest, Carson promotes a cultural awareness of a valid threat to this habitat. The once beautiful and vibrant environment described in this fable is soon metamorphosed into a landscape of death, the woodland lacklustre and hushed. This utter destruction is not attributed to the conventional fabled foes such as witches who wish to ruin and conquer, such as Jadis in *The Chronicles of Narnia*. Instead, it is humankind who has wreaked such environmental devastation, as is made explicit when we read that 'no witchcraft, no enemy action had silenced the rebirth of new life in this stricken world. The people had done it themselves' (Carson, 2000, 22).

The wicked spell that humankind casts over this environment is of a toxic chemical nature, a pesticidal curse in which 'the enchanted forest of the fairy-tales has become the poisonous forest in which an insect that chews a leaf or sucks the sap of a plant is doomed' (Carson, 2000, 46). In a similar vein to *The Little Red Wolf*, 'A Fable for Tomorrow' heralds a critical transition from the forest and its endemic flora and fauna as perilous, to imperilled. Forests, much like other landscapes perceived as hostile in popular culture—such as the Arctic with its ice and ravenous bears, have become 'victims of hubris rather than the monsters of yore' (Smith and Hughes, 2016, 6). If our arboreal loci are to survive and prosper, what we require are more works such as *The Little Red Wolf* and *Silent Spring* that aim to reform our collective approach to this vilified environment via their recharacterization of the woods as threatened and vulnerable, lest in the proximate future these loci are confined to the domain of the fictional. Instead of tale upon tale of evil or benevolent woodlands, we will wind up with a treeless spoken narrative that proceeds 'Once upon a time there were forests…'.

Chapter Five

From the Forestscape to the Technoscape: The Radical Abundance of Nanotechnology and its Environmental Ramifications in *The Long Earth* and *The Three-Body Problem*

5.1: Introduction

The field of nanoscience is delineated in a similar vein to the twofold depiction of the forest in popular culture as either a benevolent or malevolent environ. What we find in nanoliterature is a strand of science that could, in equal measure, herald a utopian world of plenitude and vanquished ill health, or the complete and utter annihilation of the planet. This science, whose purpose is the manipulation and control of the structure of matter at the scale of nanometers, the size domain of individual atoms and molecules, is enmeshed with the domain of science fiction (see Milburn, 2008). What the scientific world has anticipated for this field reads like the stuff of a science fiction novel, while science fiction has forecast some of the principal ambitions for and anxieties about nanoscience, even before Richard Feynman and K. Eric Drexler, who are considered to be the scientific fathers of nanotechnology, had written their seminal lectures and books. The border between science fiction and nanoscience is thus rather blurred, for both must confront speculative nanofutures with no true idea of what could be realised in this field, either for better or for worse. This introduction provides a concise overview of the inception of nanoscience, and emphasises its intertwined relationship with science fiction. It examines the chief beneficial and adverse outcomes the fathers of nanoscience envisioned the nanofuture could hold, and the fact that many of these ideas appeared in science fiction several decades earlier. It then ends with a

discussion of the ultimate worst-case scenario prophesied about nanoscientific advancement, the notion that nanobots (nanoscale robots) could run amok and devour the world, and its persistence in popular culture.

The next part of the chapter examines the fifth instalment of *The Long Earth* series, *The Long Cosmos* (2016), and its interpretation of this worst-case nanoscenario. A nanobot loosed on a world for a specific purpose, malfunctions and reproduces until the entire biomass of the planet is reconstituted into nanomass. This section also compares the careless operator and monstrous technoscientific micro-machines found in this tale with the trials and tribulations of the reckless creator and ruinous creation in *Frankenstein* (1818), as both of these narratives advise due caution in the face of scientific endeavour. In the third part of the chapter the focus is on *The Three-Body Problem* (2006), and its relation of another concern about what the nanofuture could hold—the fear that the advancements in nanoscience could lead to the development of an invisible and lethal nanoweapon arsenal. This is followed up with a final section that departs from the representation of nanoscience in science fiction in order to allow for a crucial window into current research in this field and its implications for human and environmental health. This section demonstrates that, while nanobots and nanoweapons are not a part of the foreseeable nanofuture we need to be concerned about, more down-to-earth worries persist about what will happen when nanomaterials are released en masse into the environment, either for a specific purpose such as water decontamination or agriculture, or due to discarded nanoproducts that enter wastewater or landfill.

The potential of nanoscience to revolutionise the world of the future, initially for the better, is often attributed to Richard Feynman's lecture, 'There's Plenty of Room at the Bottom: An Invitation to Enter a New Field in Physics' (1959). This lecture examined what is theoretically possible in the future of nanoscience. The most spectacular of these ideas

concerned the possible construction of small-scale machines in the form of miniature mechanical hands. These hands could be used to manufacture smaller mechanical hands, which could in turn be used to fashion micro mechanical contrivances for medical treatment (Feynman, 2011, 900-902). These nano devices would enable one to be operated on and repaired from within, or as Feynman puts it, to 'swallow the surgeon' (2011, 900). This micro-mechanical surgeon could, for instance, be inserted into a blood vessel in which it would travel to and examine the heart and feed the information out to a computer. It would then discover which valve was defective and produce an instrument with which to remove it (Feynman, 2011, 900). In addition, other nano machines could reside forever within one in order to facilitate an impaired organ (Feynman, 2011, 900).

This lecture owed a substantial amount to the world of science fiction that remained unmentioned, which upends the notion that this was the origin of nanoscientific discourse. The ideas presented in the Feynman lecture were in fact described in earlier pulp science fiction, which had anticipated the development of nanoscience in much the same manner that other science fiction had forecast the development of everything from flip phones (*Star Trek* in 1964), or that humankind would travel to the moon, as seen in Jules Verne's novel *From the Earth to the Moon* (1865). The Robert Heinlein novella *Waldo* (1942), had hitherto described the fabrication of such wondrous little mechanical hands that could be used to transform the existence of humankind for the better. Due to a muscular disease, Waldo invents instruments known as waldoes, which are mechanical hands of various sizes that permit him to manipulate matter on both a macro and a micro scale. The tiniest waldoes are equipped with tools which he uses to operate on nervous tissue, and with scanners in order to examine its performance in situ, and to communicate this information back to an external data source.

Nanodiscourse has thus existed for a considerable amount of time, predating its oft-touted inception. It was not until K. Eric Drexler published his seminal book *Engines of Creation: The Coming Era of Nanotechnology* (1986), however, that nanoscience entered into public discussion. In a similar manner to what was theorised about nanoscience beforehand, Drexler envisioned a future in which nanoscience could herald a new epoch in medicine, one in which computer-directed cell repair machines could mend deterioration, and even put a stopper in death, either due to their removal of diseased cells, or in their use to restore those preserved in frozen biostasis to life (1990, 99-116). The marvellous potential of nanoscience as outlined in this book also extends to what it could do for environmental woes. We read that this novel scientific field could, in principle, heal the ailments of the planet in addition to those of humankind. This concept depends on the future development of small-scale 'planet-mending machines' that would be sent forth to reverse the harm inflicted on the natural environment since the Industrial Revolution (Drexler, 1990, 121). In much the same vein that its dream of cell repair machines would be realised in order to remove cancerous and other malignant cells, *Engines of Creation* envisions a future in which 'cleaning machines' would be called on in order to remove environmental toxic waste and restore the planet to a robust state of health (Drexler, 1990, 121).

The brilliant and multifaceted potential of nanoscience as outlined in *Engines of Creation* is, however, balanced with an equal amount of ruinous potential that has marred the field ever since. Juxtaposed with its promise, the book is littered with the potential of nanotechnology to ruin the planet. For instance, Drexler writes that nanoscience will come about 'for better or for worse', and further posits this is a field with which we will either be able to remake our world for the better, or one that will cause its annihilation (1990, 4). The predominant threat underscored in this book stems from the potential development of nanobots that could build copies of themselves which would then be directed to construct

useful products, and the fear these small-scale robots could instead become uncontrolled and run amok. Drexler cautioned that, should this worst-case scenario befall the planet, the micro-machinic takeover would be rapid and absolute, until all available matter was transformed into a machinic slush. We read that nanites 'could spread like blowing pollen, replicate swiftly, and reduce the biosphere to dust in a matter of days', and that these devices 'could easily be too tough, small, and rapidly spreading to stop—at least if we made no preparation. We have trouble enough controlling viruses and fruit flies' (Drexler, 1990, 172). The miniscule machines we once upon a future time hail as wondrous, embarked on some noble cause such as environmental clean-up, could, we are forewarned, deviate from their work, and obliterate the planet.

This particular scenario transpires in the science fiction novel *Century Rain* (2004), by Alistair Reynolds. In this narrative, we read that a flotilla of nano machines is released into the environment in an attempt to fix the climate crisis. While these presumed brilliant nanobots act as an adequate techno-scientific sticking plaster for the problem in the short-term, in the end, these devices become uncontrolled and endeavour to devour the biosphere for their own self-interest, which is self-replication and absolute dominion of the planet. In order for the nano machines to self-replicate, all biotic matter, from plankton to humankind, is deconstructed and reassembled into new swarms of machines, in a rapid takeover that voids the planet of life, and metamorphoses it from a vibrant ecosphere, into a monstrous technosphere. This disquietude that the nanobots of the future could become unchecked and run amok until the biosphere has been reduced to dust, is what Drexler characterises as the 'gray goo problem' (1990, 172). However, just as science fiction anticipated some of the fine future advancements in nanoscience, it had also prophesied this worst fear in a much earlier work than *Engines of Creation*. The novella *He Who Shrank* (1936), introduced the idea that entities from the nanoworld could take over the planet. In this tale, the main character shrinks

down into the atomic universe contained within a piece of metal, in which he lands on a planet overrun with little mechanical contrivances, who are intent on the purposeful deconstruction and reformation of the matter of this world into further copies of themselves. While humankind has fled this terrible menace it has loosed upon the planet with a mass exodus into space, we discover that the nanobots have since evolved to travel out into the cosmos, and it is feared that these micro-machines could diffuse until nowhere in the universe is left unscathed.

The concern that a quantum leap in nanoscience could herald autonomous nano machines that could munch the biosphere into a mechanical mire has since become a cornerstone of nano-science-fiction. For instance, in *Bloom* (1998), by Wil McCarthy, insatiable nanomachines called mycora escape human control and convert the planet and the rest of the inner solar system into more of themselves, so humankind is forced to relocate, and now resides in the cold dark recesses of outer-space. In *Prey* (2002), by Michael Crichton, a nanoswarm is released into the desert as part of a lab experiment and allowed to evolve in the environment, in which it consumes mammalian tissue in order to reproduce. It is, however, quashed before it can spread and dismantle the planet in a Drexlerian 'gray goo' scenario. This bleak forecast about what nanoscience could wreak on the planet has also cropped up in other modes of popular culture. The animated television series *Adventure Time* (2010-2018) is one such example, with its inclusion in season six of a three-minute short, 'Have You Seen the Muffin Mess' (2015). In this short, Princess Bonnibel instructs her nanomachines to fabricate a batch of muffins in a tin. However, the nanites fail to listen when told to stop production, and replicate to such an extent that all proximate matter is manipulated to create more muffins. The muffin pestilence is curtailed, in the end, however, with the help of another character, before the entire world mutates into a muffin-sphere.

The persistent motif in popular culture that embodies the fear that futuristic nanites could run amok and consume the planet, underlines those anxieties about this most serious of potential risk scenarios still exist. This is despite the efforts of recent scholarship to reclaim the field of nanoscience from the public fixation on the theoretical catastrophe of voracious nanoscale robots. The vision of potential planet-wide annihilation disseminated in *Engines of Creation* has stuck. In his latest book, *Radical Abundance: How a Revolution in Nanotechnology will Change Civilisation* (2013), Drexler lamented that his seminal work spawned a 'monster-meme' in which 'tiny machines that would somehow run amok came to be seen as an enormous, intractable risk, one that was somehow inherent to nanotechnology' (200-201). These fanciful ideas have afflicted nanodiscourse ever since, despite reassurances that such fears are misplaced, for the nanoparticles we can create at present are a world apart from the hordes of voracious nanites that the public had anticipated would soon become part and parcel of the nanoworld.

5.2: *The Long Cosmos* (2016) and the Untaming of the Drexlerian Goo

In *The Long Cosmos*, this worst-case nanoscenario in which out-of-control nanobots metamorphose the entire planet into a machinic slush, as prophesised in earlier nanoliterature, materialises once more. Mr Clifford Driscoll is a literature teacher who ventures forth on a quest to disseminate the word of Shakespeare as far across the populated worlds as he can step, to ensure that some crucial component of human culture from the epoch of one planet would endure in these new worlds. In order to take the word of the Bard stepwise, Driscoll affects the moniker 'Johnny Shakespeare' and announces that 'one world at a time, like Appleseed wandering across the Old West, I will plant the seed of Shakespeare to flourish on each new Earth' (Pratchett and Baxter, 2017, 167-168). Driscoll rules out the use of electronics for his cause, because these are few and far between in the frontier worlds, and he

thinks that theatrical performance is too complex. It is also unfeasible for him to purchase hard copies of the complete works of Shakespeare for his mission. This is because, as his friend Chet Wilson points out, 'there's said to be people scattered over the worlds out to Earth West 1,000,000 and beyond. If just one tenth of one percent of those worlds is settled, you're gonna need a thousand books. How far you reckon you could carry a thousand books?' (Pratchett and Baxter, 2017, 168).

This dilemma is soon resolved when Wilson calls Driscoll to his workshop and furnishes him with an unusual device. We read that 'it was a book, a complete edition of Shakespeare, but it stood on a set of spindly legs, just a few inches off the bench, and Mr Driscoll glimpsed miniature manipulators of some kind dangling from the underside' (Pratchett and Baxter, 2017, 168). This machine is a matter printer, 'a complete edition of Shakespeare that was capable of reproducing itself' (Pratchett and Baxter, 2017, 169). Wilson tells Driscoll that when he arrives at a new world, he should place the device on the forest floor in order for it to commence its work. The machine then 'rushes over to some tree—a fallen trunk will do, even a sapling. And he starts to chew up the wood into pulp to make paper, and then he finds gall and such to make ink' until 'page by page—out pops Shakespeare' (Pratchett and Baxter, 2017, 169). This device reads as a variation of the futuristic assembler that Drexler wrote about in *Engines of Creation*—a solar-powered machine that could be instructed to fashion all sorts of stuff, from the humble chair, to spacecraft, to more assemblers, with resources constructed from the atoms in the soil and air (1990, 63).

Bedazzled with this invention that will enable him to fulfil his quest, Driscoll is inattentive to a crucial piece of information. When Wilson explains that all will be well for him unless the matter printer should deviate from its instruction, we do not discover the

reason why this could be a matter of concern. Driscoll is much too preoccupied ‘dreaming of the speech he would make to announce his new venture to the world’ to listen (Pratchett and Baxter, 2017, 170). In this crucial moment, from which henceforth he is responsible for this novel machine, his head is in the narcissistic clouds. The mission to provide a compendium of Shakespeare to each occupied stepwise planet is at first a marvellous success. Driscoll covered hundreds of worlds in which ‘he would send his matter-printer master edition off to the forest to spawn, and wait for the new copy of the works to be produced’ (Pratchett and Baxter, 2017, 171). We read that sometimes he would ‘deliver a talk’ or ‘teach a class or two’ until he could present the book, and that he considered his venture to be a ‘success’ (Pratchett and Baxter, 2017, 171).

This contented period is short-lived. On Earth West 31,415, Driscoll puts the matter printer to work as usual and awaits the fabrication of a new book of the Bard. However, when he sets out to retrieve it, what he discovers next to the machine is not the reading copy he expected. Instead, it is ‘*another master copy*, another crab-like gadget, a copy of the book on a series of spindly legs. Puzzled, he reached for the new copy—but it scuttled off out of his reach and out of sight’ (Pratchett and Baxter, 2017, 172). This curious incident does not alarm Driscoll. Rather, he puts the first machine to work once more in another part of the forest where, in due time, it produces the desired result. When he has delivered the new Shakespeare, he steps onwards with no further rumination on this world and the soon-to-be-catastrophe that he has unwittingly unleashed there—until he is pursued a short time later and told that he must return at once.

When Driscoll comes back to Earth West 31,415 and looks upon the forest where he released his matter printer, part of it has vanished. Whereas before it was a network of arboreal life, the forest floor is now a machinic carpet alive with ‘crab-like’ creatures that

‘crawled and rustled and clambered up the trunks of the surrounding trees, pages on their backs stirring like ladybird wings’ (Pratchett and Baxter, 2017, 173). We learn that these are ‘Shakespeares’, not reader copies like those delivered across the parallel worlds, however, but more master copies like the one Driscoll abandoned on this world beforehand (Pratchett and Baxter, 2017, 173). The impact of these devices on the material environment of this world is severe, and their spread is exponential until there is scant verdure left on the planet. The farmer who pursued Driscoll stepwise tells him that the printers have self-replicated and spread to the extent that about ‘a ton of lumber’ has been devoured and reassembled into a horde of these micro-machines in a little over a week (Pratchett and Baxter, 2017, 173). In a direct reference to the worst-case nanoscenario foretold in *Engines of Creation*, he curses Driscoll for the veritable ‘grey goo’ catastrophe that he has unleashed on their world (Pratchett and Baxter, 2017, 173). This transmutation of biomass into an amorphous and frenzied machinic swarm continues to escalate until ‘just fifty days after Mr Driscoll had released his original master copy, almost every tree on Earth West 31,415, indeed the bulk of the planet’s continental biomass, had been converted’ (Pratchett and Baxter, 2017, 175-176).

The collapse of arboreal matter does not, alas, halt the advance of the machinic tide, as the devices then evolve to demolish alternate varieties of both verdurous and non-verdurous matter in order to continue their newfound purpose of self-expansion. Driscoll explains that the devices have since metamorphosed to consume all plant matter on land and in the sea, from ‘grasses’ and ‘shrubs’ to ‘seaweed’, and that some of them have even cannibalised their nano-counterparts in brutal performances of ‘Bard eat Bard’ (Pratchett and Baxter, 2017, 176). This mutation is cause for much disconcertment, as it underscores that, soon, the entire planet will be disassembled and reconstituted into a machinic sphere. This rapid conversion of innocuous matter into a malevolent and amorphous mire of nanomass is what Drexler warned could come to pass in his nanocalyptic conceptualisation of ‘gray goo’

(1990, 172). If a matter replicator is unrestrained, Drexler cautioned, (as is the case in *The Long Cosmos*), and it has sufficient space and resources, it will continue to produce copies of itself, which will each build more copies, until there is no more room or matter to do so (1990, 58). One unchecked matter replicator could thus imperil the planet—a lesson that is learnt much too late for Driscoll and Earth West 31,415. The fact that the devices in *The Long Cosmos* just require 'carbon' to reproduce, whether Shakespearean anthologies or more copies of themselves, means that we can speculate that if humankind remained on this world, it too would be assimilated into the nano-soup that now lies like a film over the landscape of this world (Pratchett and Baxter, 2017, 170). In the end, the inhabitants of Earth West 31,415 have to be evacuated and the world quarantined, lest the nano-epidemic should diffuse across the necklace of parallel worlds.

This catastrophe in which animated workbench matter is allowed to run amok in the world has much in common with that much earlier tale of a workshop creation unleashed on the planet. In a similar vein to the plot of *Frankenstein* (1818), the nano-epidemic chapter of *The Long Cosmos* delineates an irresponsible creator who fantasises about the future esteem that will be attributed to him as a result of his techno-scientific endeavour, but then is reluctant to confront the fallout from his experimental pursuit. Victor Frankenstein and Driscoll both choose to put their own ambition, whether life after death or the immortalisation of the Bard in the parallel worlds, before the fate of their respective environs. In each instance, manufactured entities are permitted to run riot across the landscape and cause death and destruction, either of humankind or of plant matter—ruination that could have been prevented had each 'father' taken better care of their respective techno-scientific progeny.

The creatures likewise share a lot of the same attributes. For instance, both are unfinished handiworks when sent forth into the world and abandoned. We know that the former is deprived of cognitive development because its creator flies from it after it has received the spark of life, while we read that the matter replicator is also in an infant phase of development as a 'prototype' (Pratchett and Baxter, 2017, 168). In relation to their appearance, each creature is an assemblage of materials, either made from various dead bodies or with less abhorrent matter such as metal and paper, and both are represented as horrific to behold. While Victor decries his creature as abominable in all of his features such as his 'shrivelled complexion' and 'black lips', Driscoll considers the matter printer 'as a kind of grotesque crab' (Shelley, 1999, 45; Pratchett and Baxter, 2017, 168). These creatures are thus both depicted as monstrous in and of themselves, and in their effect on their respective worlds. In addition, both entities commence their lives in the external world as benevolent. In *Frankenstein,* this is demonstrated when the creature collects firewood for his unaware human protectors, and in his salvation of a child who would otherwise have drowned. In *The Long Cosmos*, this benevolence takes the form of a compliant machine that processes forest into book after book of cultural importance without error, for the sake of humankind over an extended period of time.

This initial period of kindness from these manufactured entities is, in time, short-lived, either due to the cruel nature of humankind (*Frankenstein*) or via a machinic metamorphosis (*The Long Cosmos*). The second matter replicator revolts and causes ecocidal havoc, in much the same manner that the creature turns on his creator and wreaks familial ruin. Thus, as in *Frankenstein*, 'in gray goo, the ultimate control of matter has ineluctably produced the ultimate example of matter in rebellion' (Milburn, 2008, 119). However, while the biovorous matter replicator embarks on the conversion of biomass into more nanomass, the creature in *Frankenstein* is not afforded the chance to produce a 'race of devils' that could

overrun the planet (as Victor envisions, he would, despite the word of the creature that this would not be so), as his would-be partner is torn apart on the workbench before completion (Shelley, 1999, 127). Both Victor and Driscoll do not speak up or take action to amend what each has loosed on the planet until it is much too late, and the harm is irrecoverable. Victor absconds from the locus of the creature's monstrous birth and tries to direct his attention elsewhere with a resolve to remain silent (at the cost of several innocent lives) and tells another person about the creature only after all is in ruin. An indifferent Driscoll, meanwhile, travels onward to other worlds with his first matter printer (which has reset itself and recovered) with no consideration of the peril that he has left in his wake 'until, ten days later, an agitated farmer pursued him stepwise and demanded that he come back' (Pratchett and Baxter, 2017, 172).

However, even when both are confronted with the fallout from their techno-scientific progeny, the impression remains that each feels sorrier for themselves than about what they have wrought. We read that Victor is a constant klaxon of wretchedness, as evidenced in his woeful utterance that 'the wounded deer dragging its fainting limbs to some untrodden brake, there to gaze upon the arrow which had pierced it, and to die—was but a type of me' (Shelley, 1999, 73). In a similar instance of melodramatic narcissism, an imprisoned Driscoll proffers the Shakespearean lamentation, 'blow, blow, thou winter wind, thou art not so unkind as man's ingratitude' (Pratchett and Baxter, 2017, 176). This line is a testament to his self-absorption. He believes that the people of this world should be thankful that he decided to bestow a piece of culture on them, despite the fact that this self-same cultural artefact is the reason for their evacuation and the annihilation of their planet. We thus encounter in both *Frankenstein* and *The Long Cosmos* two irresponsible architects blinded with hubris who are reluctant to be held accountable for the consequences of their reckless technoscientific deeds.

In both is a critique of uncontrolled and reckless experimentation and its unintentional but monstrous aftermath.

The Long Cosmos thus underscores the inherent risks and uncertainties attached to new technoscientific developments. While the quest that Driscoll sets about across the alternate worlds is laudable, what we are presented with in this narrative is another (though fictional) example of how a creation devised for the betterment of humankind can soon become the apparatus of annihilation because of a lack of due caution. The biovorous matter replicator thus echoes other sensational-turned-horrific inventions such as DDT, which, as *Silent Spring* (1962) illuminated, went from ideal insecticide to a poisonous death sentence for a host of animal life. This nano-disaster is as much comical in its delineation of a horde of insatiable Shakespeares as it is a terrible environmental catastrophe. However, its value is not in how accurate its predictions are about the hazards of nanotech—for the more acute and actual risks are much less fantastical—but in how it alerts readers to the importance of taking risk seriously. While it is at the extreme end of speculation about what the nanofuture could hold, it does promote careful reflection about how one should approach new technoscientific advancements with caution—for a new invention unleashed on an unprepared world can prove as futile to contain as toothpaste liberated from its tube.

5.3: Nano-Wars: *The Three-Body Problem* (2006) and the Rise of Nanoscopic Weaponry

While *The Long Cosmos* focuses on the familiar worst-case scenario that we are told could be born from advancements in nanoscience, *The Three-Body Problem* presents us with another potential hazard of this field that does not receive quite as much attention as the hellish vision in which the world could be turned into a machinic slush. This possible threat derives from the creation and use of nanoweapons, which—if uncontrolled or permitted to fall into wicked

hands—could have a calamitous impact on the planet. In *Nanoweapons: A Growing Threat to Humanity* (2017), Louis A. Del Monte writes that there are a number of scenarios in which we could be faced with such doom, whether accidental or intentional. One such instance that he describes, with the potential for causing unintentional havoc, is the future development of nanodrones and nanobots intended to be used for covert military operations such as surveillance and assassination. If a vast amount of these devices were released, and it was discovered thereafter that there was a fault, the machines instructed to kill a particular person or people could instead annihilate all who encounter them. This would mean that the nanoweapon of select destruction would metamorphose into 'a weapon of mass destruction' (Del Monte, 2017, 88). This new form of weapon could also be used to wreak intentional devastation. For instance, Del Monte describes one scenario in which a nation could fashion 'artificially intelligent nanobots, with functionality similar to mosquitos', that seek out and inject toxin into the population of another nation (2017, 6). This would herald a whole new level of mass murder that was invisible, and thus inescapable. In another such scenario, nanoparticles identified as toxic and which are known to cause irreparable harm when inhaled or consumed, could be dumped 'into a nation's reservoirs, its environment, or somewhere along a nation's bio food chain' (Del Monte, 2017, 14). The fact that ill effects would take time to appear would mean that this plot would remain undetected until those affected were past the point of treatment and it was too late for counter-measures.

It is also possible that nanomachines fabricated for the betterment of the planet, whether those created to cure disease or to clean up pollution, could also spell doom for the planet as the initial idea behind these devices could be amended to enact a malevolent enterprise on the world. For instance, in *The Lazarus Vendetta* (2004), by Robert Ludlum and Patrick Larkin, medical nanodevices created to penetrate cells and detect and eliminate those that are cancerous or otherwise diseased, are reworked so these micro-machines intended to

cure instead become invisible death machines that dissolve humankind into an unidentifiable mess of bones and slime. The person responsible for this weapon of mass destruction, Hideo Nomura, is a mad (nano)scientist character who is also the leader of a radical environmental movement. In his secret laboratory, Nomura manufactures what he believes to be instruments of world salvation—undetectable clouds of death that will rain down onto cities and cleanse the world of most of the human population in order to restore balance. This scheme is, however, foiled at the last second.

While in this novel the fruits of nanoscience are used for a nefarious scheme that could decimate humankind, in *The Three-Body Problem*, those same fruits are used to vanquish rather than enact evil. Whereas in *The Lazarus Vendetta*, an environmental extremist and his followers intend to use nanomachines to exterminate most of the human population, in *The Three-Body Problem*, nanomaterial is used to annihilate a radical environmentalist movement and its misanthropic leader, Mike Evans, who also want to eliminate humankind—though in a different manner of technoscientific inspired doom. Rather than clouds of nanodevices that can consume people from the inside out, the latter use a parabolic antenna on a ship to beam information to an alien power which will help them to conquer the planet and quash humankind. In order to stop the movement and intercept the communications that have occurred between them and the extra-terrestrials, a covert operation takes place in which multiple 'parallel, thin filaments', made from a new nanomaterial called 'Flying Blade' are suspended across a canal that the ship must traverse on a particular date (Liu, 2016, 365). These nanofilaments are 'about one-hundredth the thickness of human hair', and so are the ultimate invisible weapon in the war upon this movement (Liu, 2016, 365). The nanofilament net slices the ship and its entire crew apart with the ease of a cake knife, and the data is recovered. Thus, as the operation occurs as

planned with no accidental or dire fallout, we can conclude the use of nanoweapons, at least in this scenario, is a success.

The concern about nanoscience and what ills it could entail for the planet is raised in the second part of *The Three-Body Problem*. In this section we are introduced to Wang Miao, the creator of the nanomaterial used to accomplish the secret quest. In a brief conversation between the nanoscientist and a police detective, the latter enquires if his new nanomaterial 'could be used to commit crimes', because he has heard that 'a strand of that stuff could be used to lift up a truck' or to 'slice a car in half with one stroke' (Liu, 2016, 55). While Miao confirms that this novel material would be hazardous in the hands of a criminal, he also replies, 'but what can't be used for criminal purposes? Even a dull knife for descaling a fish can!' (Liu, 2016, 55). The detective concurs, and relates that 'even a fish can be used to commit a crime. I handled a murder case once. Some bitch cut off her husband's family jewels. You know what she used? A frozen tilapia she got out of the freezer! The spines along the back were like razors' (Liu, 2016, 56). This discussion initially reinforces the anxieties that surround nanoscience as it underlines the power that could be afforded to the villains of the world should these new nano-innovations fall into their hands. However, it then minimises these concerns in its parable that risks and hazards can be found even in the most domestic of places, and can emanate from the most banal and unexpected items, such as a frozen fish, never mind within the confines of a nanoscience research center.

This is not to say that the narrative is indifferent to the theoretical futuristic evils of nanoscientific advancements, but rather that it declines to participate in technophobia. Instead of alarm about nanobots run amok or other fantastical forecasts about what the nanofuture could look like, *The Three-Body Problem* adopts a rational approach and underscores the need for due caution with new nano-developments, lest one should permit them to spell

disaster for the planet. The invention of every new technology equals the fabrication of new potential risks. This is not a new phenomenon. For instance, 'the invention of the boat was the invention of shipwrecks. The invention of the steam engine and the locomotive was the invention of derailments. The invention of the highway was the invention of three hundred cars colliding in five minutes. The invention of the airplane was the invention of the plane crash' (Virilio and Lotringer, 2008, 46). Should we therefore wish to proceed with our technoscientific endeavours, write Paul Virilio and Sylvère Lotringer, 'we must think about both the substance and the accident' (2008, 48). What we thus need to do is to strike an appropriate balance between the world of nanoscience and the potential consequences of this novel field—for better or for worse. If we take heed of caution, we can hope to avoid a future that is clouded with miniscule but monstrous nano-creations.

5.4: Nanofutures: The Speculative World of Science Fiction versus the Experimental World of Science

While the prospect that the planet will be confronted with an accidental or intentional nano-annihilation scenario is doubtful, this much peddled concern has been replaced with a succession of more plausible, data-substantiated anxieties about what the nanofuture could entail for the environment. Since nanoscience is a developing field, however, there is still much we need to know in order to determine the potential adverse impact of nanomaterials on environmental health. What we do know thus far hails from the field of nanoecotoxicology. This research area developed as a response to unease about latent unintended harm to the natural world, and aims to predict harmful environmental effects of particular manufactured nanomaterials on different species and habitats. In experiments undertaken to estimate whether or not nanomaterials could harm the environment, certain nanomaterials have been shown to disrupt environmental equilibrium due to bioavailability

and bioaccumulation. The research undertaken so far in relation to aqueous habitats has underlined the proposed use of nanomaterials to resolve the clean water crisis can produce a number of new eco-crises.

Manufactured nanomaterials such as silver and titanium-dioxide nanoparticles, which have proved to be effective in the decontamination of water (see for instance Ball et al, 2019), have exhibited a number of ill-effects to aquatic lifeforms that undermine their potential benefit. If we examine titanium-dioxide nanoparticles, studies (see for instance Yeo and Nam, 2013), have noted their bioaccumulation and trophic transfer from biofilms to water snails. This indicates their potential to travel further along the food web from fish up to humankind. In other studies, (see for instance Sun et al, 2007), titanium-dioxide nanoparticles have reacted with other environmental contaminants such as arsenic, and increased their uptake in certain species such as carp. The research carried out to predict the impact of nanosilver in aqueous environs has also led to anxieties about the impact on environmental health. For instance, Marie-Noële Croteau et al (2011) found that *Lymnaea stagnalis,* a species of freshwater snail, can accumulate nanosilver in their gut tissues. Their experiments revealed that nanosilver can affect the appetite and manner in which consumed food is digested by these snails. This is a matter of environmental concern because this 'disruption of gut function along with reduced feeding activity can trigger adverse effects that can propagate to higher level processes like growth and reproduction, and ultimately affect populations and communities' (Croteau et al, 2011 660).

In addition to its delineation of potential hazards that could materialise due to the use of certain nanomaterials in water purification, research has also underlined their potential impact on flora and fauna that dwell on *terra firma*. There have been a number of proposed uses for nanomaterials on land such as 'nanofertilizers, nanopesticides, and nanosensors'

(Chhipa, 2019, 116). However, as with their prospective use in water decontamination, the fruition of these ideas relies on additional data to establish the behaviour and fate of these materials on the terrestrial environment. The research undertaken thus far in order to examine the impact of nanoproducts on soil ecosystems has indicated that some of these materials could be toxic to soil inhabitants. For instance, an experiment carried out to examine the impact of nanosilver on the isopod *Porcellionides Pruinosus*, a species of woodlouse, found that nanosilver could accumulate in this species 'until it reaches toxic levels, and may pose a threat to terrestrial isopods in case of long-term exposure' (Tourinho et al, 2016, 276). As with research undertaken with small aqueous fauna, concerns have also been raised that because of 'the high levels accumulated in isopods', nanosilver could be 'transferred to possible predators' (Tourinho et al, 2016, 276).

If we examine the risk of harmful exposure to and absorption of manufactured nanomaterials in vegetal life, studies undertaken so far with crop plants cultivated in soil contaminated with metal nanoparticles that could enter the environment en masse in the future, have evidenced the presence of these materials in their edible tissues (see for instance Hernandez-Viezcas et al, 2013, and Servin et al, 2013). These studies have been followed with more research that has evidenced the trophic transfer of nanomaterials accumulated in food crops to other levels of the terrestrial food web. Joseph Hawthorne et al (2014) found that zucchini planted in soil that contained cerium-oxide nanoparticles was transferred from crop to cricket to wolf spider, Roberto De la Torre Roche et al (2015) observed that lettuce cultivated in soil amended with lanthanum oxide nanoparticles transferred from crop to cricket to darkling beetle, and Sanghamitra Majumdar et al (2016) have reported that kidney bean plants grown in soil polluted with cerium oxide nanoparticles transferred from crop to Mexican bean beetles to spined soldier bugs. These experiments all demonstrate that

nanomaterials intended to benefit food production can be introduced into the food web with unknown consequences for human and environmental health.

There is still a radical abundance of unknowns within the domain of nanoscience that must be addressed in order for the field to develop further without risk to human or environmental health. While the research undertaken to date has been contained in laboratories and so it is difficult to extrapolate the data to the material environment, this limitation continues to act as a cushioning safety frontier between applied research and its potential deleterious or unintended fallout. In order to model environmental exposure and absorption of nanomaterials in a naturalistic but safe manner, mesocosm or environmental realism studies remain a crucial component. These are contained and controlled experiments performed with simulated external environments, used to predict the behaviour and assess the risk of exposure to, and absorption of, manufactured chemicals in a particular habitat over an extended period of time. The risks of nanomaterials must be assessed at a research and developmental level, not thereafter when toxic products have been unleashed en masse across the planet as with DDT. The limitations of lab experiments should thus not be considered scientific roadblocks, but rather as much needed preventative measures in case of environmental catastrophe. There can be no hope for the wondrous medical and environmental potential of nanoscience in the future until we can ensure extensive attention has been paid to human and environmental risk. The data is still limited due to the emergent nature of the field, and until we know more, the door to mass commercialisation of nanomaterials must remain shut, lest a swarm of invisible slow violences be unleashed on the planet.

Chapter Six

Earth versus the Extraterrestrial: Alien Worlds and the Fate of the Planet in *The Three-Body Problem* and *The Long Earth* Series

6.1: Introduction

The question of whether or not there is complex life elsewhere in the cosmos has preoccupied the human conscience for centuries. While the search for extraterrestrial life has thus far returned no more than a cosmic tumbleweed of silence, as we have detected not even a peep from stars that could host habitable planets, the quest to find cosmic kinship has been embroiled in concerns about the future of Earth should we encounter, and even communicate with, an extraterrestrial civilization. The potential risk associated with the search for and contact with extraterrestrial life is underscored in the scholarship of the astronomer and science fiction writer David Brin, who writes that, while it is safe for us to listen for indications of other sentient lifeforms in the cosmos, we should refrain from active endeavours to attract attention Earthward (2019). Those in favour of communication with extraterrestrial civilisations argue that, due to radio and television leakage, humankind has been broadcasting a clamorous opera into space for some time (Brin, 2019). These pro-contact proponents thus assert it is futile to enact a moratorium on contact endeavours, 'because that would be like trying to close the door of a stable, after the horses have already bolted' (Brin, 2019, 17). This response directed at those in support of a much more cautious, passive approach to the search for extraterrestrial life is defined as 'the Barn Door Excuse' (Brin, 2019, 20). It is the belief that 'advanced extraterrestrials must already know we are here, and hence it would be harmless to amplify Earth's radio detectability by many million-fold' (Brin, 2019, 2).

This rationale that we are therefore safe should we wish to partake in intentional, directional interstellar communication is, however, ever-so-flawed. The transmission power harnessed in order for humankind to broadcast information about planet Earth to the rest of the universe would be far more obstructive than our current, unintentional leaks. Brin compares this chasm in detection between these two forms to someone slapping the water of a lake in Morse code in order to attract the attention of a person on the other side, versus someone with a laser pointer who then proceeds to do the same thing (2019). The latter, of course, will be much more noticeable. We cannot know whether we will encounter a benevolent or a malevolent alien civilization, and so it is prudent to listen before we decide to shout all about our planet into the cosmos. The confirmation that there is other intelligent life in the universe, could be a much worse fate for the planet than the realization that we are alone on this rock in the universe surrounded with the silence of infinite space. Therefore, just because the barn door has been opened a crack, does not mean we should open it further.

This chapter examines three different models of extraterrestrial encounter and their consequences, whether catastrophic or wondrous, for planet Earth in *The Three-Body Problem* and *The Long Earth* series. The first sub-section concerns *The Three-Body Problem* series, and its subscription to and treatment of the alien invasion or reverse colonisation narrative. This part of the chapter demonstrates the ways in which these novels subvert the romanticised notions of contact optimists such as Gilbert Levin, who consider the search for extraterrestrial life 'the greatest treasure hunt in history', and instead underlines the harsh truth that, in this dark forest of an amoral universe, 'contrary to the happy wishes of most people, it was not a good idea for the human race as a whole to make contact with extraterrestrials' (1968, 55; Liu, 2016, 186). In the second sub-section, the focus is on *The Long Earth* series, and its dualistic approach to alien first contact scenarios. The first part of this section addresses the third book in the series, *The Long Mars*, and its delineation as a

colonial-imperial adventure fiction narrative in which the alien assumes the position of the invaded, as opposed to the invader. It paints a picture of the extraterrestrial as the exploited and debased victim of a Western imperial power that has set forth on an expedition to the red planet(s) with triumphal fantasies of the appropriation of treasure (in this case, pieces of ancient alien artefacts) to take back to the home planet to aid human advancement.

It also discusses how this intrusion of humankind on their world has fatal consequences for the crew, as one alien in particular ends up murdering a human due to repeated acts of humiliation that are a direct result of the human interlopers' high-tech presents given to the Martian natives. Juxtaposed with these two instances of more pessimistic and problematic relationships with extraterrestrials, the final part of the chapter explores the last book in the series, *The Long Cosmos*. It looks into the way in which this narrative disavows the well-worn science fictional motifs of the alien-as-monstrous-invader or alien-as-primitive-Other, in favour of a more convivial extraterrestrial—one that extends the hand (or perhaps tentacle) of friendship to the inhabitants of the Long Earth and invites them to join a utopian, unified, cosmic collective of alternate civilisations from each curved arm of the universe. The chapter commences with the worst of possible alien first contact encounters in *The Three-Body Problem* series, which ends with the alien annihilation of the entire solar system. However, in its treatment of *The Long Cosmos*, it ends with a sentiment of hope for a marvellous future between human and alien-kind if and when the citizens of these two chains of parallel worlds should coalesce in the midst of the Milky Way.

6.2: 'Get Ready to Go to Australia, You Pitiful Bugs!' *The Three-Body Problem* Series (2006-2010), and An Alien Encounter of the Bad Kind

The search for extraterrestrial intelligence (SETI) in *The Three-Body Problem* is hidden from the world behind the walls of the 'Red Coast Base' (Liu, 2016, 163). This place possesses a

powerful radio telescope used to both transmit radio waves toward outer space that contain information about planet Earth, such as overviews of the planet itself, its lifeforms, human civilisation, and basic world history, as well as to monitor the cosmos for a potential response (Liu, 2016, 182). For a substantial period, there is just the universal silence of radio static. Ye Wenjie remarks that 'in the dead of the night, I could hear in my headphones the lifeless noise of the universe. The noise was faint but constant, more eternal than the stars' (Liu, 2016, 191). This conception of cosmic loneliness is impactful. If we received confirmation that life was plentiful in the cosmos, it raises the question of whether or not it would be devalued, more so than humankind belittles the lives of flora and fauna as well as one another in the present epoch. If we knew for certain that we were alone in the universe, however, that life was confined to what Carl Sagan calls this 'Pale Blue Dot' (1997, 9), this leads us to consider whether we would value one another better, as it would cause us to face up to the fact that in all of the cosmos, life on our planet is one fortunate contingency, 'an accident among accidents in the universe' (Liu, 2016, 191). It is not until the sun is used as a superantenna to broadcast radio waves coded with information about the planet to the universe with much more power, that the first shout is heard in space from humankind. This does not occur, however, until a considerable time-period—almost a decade—has passed since the transmission.

The response to this cosmic clamour is confirmation that it is prudent for humankind not to shout information into the cosmos in a concerted effort to discover extraterrestrial life. The message the Earth receives is a caution not to respond: 'Do not answer! Do not answer!! Do not answer!!!' (Liu, 2016, 296). It is fortunate for the Earth that it is a pacifist from an extraterrestrial civilisation who is the first on the extrasolar (Alpha Centauri) world of Trisolaris to receive this word of life from elsewhere in the universe. This alien proceeds to send a response Earthward that 'there are tens of millions of stars in your direction. As long

as you do not answer, this world will not be able to ascertain the source of your transmission. But if you do answer, the source will be located right away. Your planet will be invaded. Your world will be conquered!' (Liu, 2016, 2). It is unfortunate for planet Earth, however, that the first person to receive this warning, Ye Wenjie, believes that, rather than utter annihilation, a 'superior civilisation from elsewhere in the universe' will instead function as a 'celestial saviour' who will reform humankind and rescue the planet from death and environmental destruction (Liu, 2016, 329; Peters, 2010, 241). This is based on Ye Wenjie's firm belief that 'if they [extraterrestrials] can cross the distance between the stars to come to our world, their science must have developed to a very advanced stage. A society with such advanced science must also have more advanced moral standards' (Liu, 2016, 376).

The faith that Ye Wenjie has in the innate benevolence of alien civilisations leads her to break faith with humankind and respond with an open invitation to the extraterrestrial invasion of the planet. She responds, 'come here! I will help you conquer this world. Our civilisation is no longer capable of solving its own problems. We need your force to intervene' (Liu, 2016, 300). This romanticised notion of a benevolent caretaker alien-kind is, however, unfounded. As Liu Cixin writes in his postscript to the novel, 'there is a strange contradiction revealed by the naivete and kindness demonstrated by humanity when faced with the universe: On Earth, humankind can step onto another continent, and without a thought, destroy the kindred civilisations found there through warfare and disease', however, 'when they gaze up at the stars, they turn sentimental and believe that if extraterrestrial intelligences exist, they must be civilisations bound by universal, noble, moral constraints, as if cherishing and loving different forms of life are parts of a self-evident universal code of conduct' (2016, 429-430). In *The Three-Body Problem*, the truth is that this rose-tinted approach to extraterrestrials is not justified. The 'beautiful fantasies' envisioned about

extraterrestrial life are soon sullied with the realisation that one cosmic civilisation is much like another, immoral and intent on its self-preservation at all costs (Liu, 2016, 37).

It is important to understand the rationale behind the proposed alien invasion from the collective alien side in addition to the individual human position. The invasion will not occur to rescue humankind from all of its inter-human and environmental ills, and nor is the choice a random act of cosmic sadism on behalf of this extraterrestrial civilisation, but rather it is sine qua non for their survival—an act of cosmic Darwinism. Their planet is a volatile world due to an extreme and erratic climate that is determined due to the advent of one or another, none of, or all of its three distinct suns. It is an environment so hostile that, in order to survive, most of their population must be stored in a suspended state until there is a sufficient stable period for them to be revived, but these are few and far between. Their world is on the brink of utter annihilation. Trisolaris is the last planet in a stellar network that once contained twelve planets, the rest of whom were consumed by its three suns. In order to have a chance at survival, their world must therefore be abandoned for another planet, lest it spell the end of their civilisation forever. Before the launch of the interstellar fleet that will set forth for planet Earth, the Princeps of Trisolaris declares, 'look at the three suns around us. At any moment, the plasma outer layer of one of them may begin to expand and swallow its last planet, our world. We have no other choice. We must make this gamble' (Liu, 2016, 387). *The Three-Body Problem* therefore conforms to the idea that extraterrestrial invasions in science fiction are often delineated as 'evacuations from dying planets, from ecosystems imperilled by supernovae, cannibalised by black holes, or rendered toxic by negligent residents who, having contaminated their own world, strike out for greener pastures' (Harris, 2017, 61). In their mission to relocate due to environmental hardship, the extraterrestrials of this narrative are positioned as extreme climate refugees, forced to abandon their planet in the hope of a better future elsewhere in the cosmos.

These extraterrestrials are therefore akin to those that we encounter in H. G. Wells' *The War of the Worlds* (1898), which likewise concerns an alien civilisation who must flee their cold and inhospitable planet for a new world. In a similar manner to the Martians in *The War of the Worlds*, for whom planet Earth becomes a beacon of vibrant optimism in the wake of their doomed planet with its shrunken oceans and attenuated air, the revelation of a near and bountiful world is also delineated as a boon for the aliens-in-peril in *The Three-Body Problem*. From their proximate position, the extraterrestrials in *The War of the Worlds* behold 'at its nearest distance only 35,000,000 miles sunward of them', a beacon of hope in the shape of 'our own warmer planet, green with vegetation and grey with water, with a cloudy atmosphere eloquent of fertility, with glimpses through its drifting cloud-wisps of broad stretches of populous country and narrow, navy-crowded seas' (Wells, 2018, 4). This description of a better world observed from a planet in its death throes, parallels that found in *The Three-Body Problem* when the Trisolaran listener reads the transmission from Earth broadcast to the cosmos. On the dark and desolate world of Trisolaris, for this is one of the more-often-than-not hostile epochs of this planet in which most of the population are stored in a suspended state, we read that the listener 'learned of the existence of Earth, learned of the world that had only one sun and remained always in a stable era, learned of the human civilisation that had been born in a paradise where the climate was eternally mild' (Liu, 2016, 379).

This disclosure of an Edenic planet allows the listener to escape, in mind if not in corporeal form, from his lonesome and bleak existence, and he is thus determined to save the Earth from invasion. In addition to the (unheeded) caution beamed Earthward, the listener also appeals to the Princeps of Trisolaris to spare this beautiful world that has captured his mind. This plea is, however, dismissed, and the Princeps tells the listener, 'you are old, and you will not live to see the final destruction of Earth civilisation. But I will at least make sure

that you know that you cannot save her. I want to let you live until the day she loses all hope' (Liu, 2016, 386). While the population of Trisolaris laud their cosmic deliverance as the interstellar fleet departs for the stars, the listener must watch, foiled in his efforts to deliver the Earth from a future war for the planet. Earth cannot, or rather, will not, be rescued from invasion because, as is the case for the Martian invasion in *The War of the Worlds*, 'to carry warfare sunward is, indeed, their only escape from the destruction that generation after generation creeps upon them' (Wells, 2018, 5). While the resolve to invade another world is, on the surface a dire affair, as the last hope for the survival of the extraterrestrials in *The Three-Body Problem* and *The War of the Worlds*, it is rational in extremis.

It is difficult to condemn the prospect of an alien invasion and what it could wreak on the planet when humankind often enacts harm, not just on the more-than-human world, but on itself. This is a valid point raised in *The War of the Worlds* in relation to the Martians and their intention to invade planet Earth, as the narrator states, 'before we judge them too harshly, we must remember what ruthless and utter destruction our own species has wrought, not only upon animals, such as the vanished bison and the dodo, but upon its own inferior races' (Wells, 2018, 5). In *The Three-Body Problem*, rather than empathising with one particular side, whether the imperilled humankind who will be crushed under the foot of invasion, or the likewise threatened extraterrestrials whose choices are to invade or perish, in which it is inevitable that barbarism will be met with barbarism, readers are instead prompted to form an alliance with the natural world as the unrepresented innocent onlooker that will be ensnared in the future cosmic crossfire for the dominion of the planet. As Isaac Asimov and Frederik Pohl write, 'there is a third party in every war' that 'commits no hostile act against either side. Nevertheless, it is attacked by the bombs, missiles and cannon of both. That is the environment. When the war is over one combatant side or the other may claim victory. But the environment always loses' (2018, 23). This idea that it is the natural world that will suffer

in the battle for Earth in *The Three-Body Problem* is envisioned in the mind of the listener when he slumbers and dreams not of the warmth and verdure of that utopia as he had hoped, but of a world 'under the bombardment of an enormous interstellar fleet, the beautiful continents burning, the deep blue oceans boiling and evaporating' (Liu, 2016, 380). The fact that he tries to jeopardise the survival of his own race in order to save another planet from interstellar warfare reads as an altruistic endeavour to prevent such extreme violence that could tear the natural world apart.

The final communication sent Earthward from the planet of Trisolaris in *The Three-Body Problem* is just one phrase that underlines that this (if we did not hitherto suspect) is an alien encounter of the bad kind. This is to declare that humankind is, from their perspective, no more than inconsequential insects, 'you're bugs!' (Liu, 2016, 418). Humankind is a diminutive taxon whose stone has been upturned, leaving them exposed to a merciless cosmic microscope. This notion recalls Daniel Harris, who writes that 'in the alien invasion plot, the tables are turned and we ourselves become the endangered species, the persecuted untermensch who must face the consequences of his own misbehaviour vicariously through the sadism of a predatory tourist from a distant galaxy' (2017, 61-62). In spite of the dearth of information about the biological appearance of the extraterrestrials, as we read in Chapter Thirty-Two that the data received from Trisolaris did not contain such descriptions, the narrative does still prompt us to question the otherness of its alien civilisation. The delineation of humankind as no more than trivial insects in their final broadcast is an indication of the extraterrestrial as a reflection of the human self, for their perception of humankind can be interpreted as a critique of our attitude towards all that is not us—as squishable matter with which we can do as we please in order to fulfil our own selfish fancies.

The alien in this tale cannot therefore be characterised as an ‘unknowable alien’, but instead falls under the umbrella of the ‘anthropomorphic’ or ‘anthropocentric alien’ (see Benford, 1980, 53-63). This idea of the extraterrestrial as not a true, fundamentally anomalous alien, but one that is more human than not, is a popular science fiction motif. When the extraterrestrial becomes somehow familiar to us, the boundaries between self (human) and (alien) other become blurred, so that one cannot establish a strict dichotomy between the two. This fuzziness between humankind and alien-kind in the novel resonates with Loren Eiseley, who notes, ‘I have read about cabbage men and bird men; I have investigated the loves of lizard men and the tree men, but in each case, I have laboured under no illusion. I have been reading about man, Homo sapiens, that common earthling’ (1946, 158). That the alien is to some extent human in mien is an uncomfortable truth that we are afraid to have beamed down on us. We want to believe that life elsewhere in the cosmos will be virtuous—not replicate the worst facets of humankind.

Those who are exposed to this last transmission from another world are filled with despair for the future of humankind on planet Earth. While some devolve into a drunken stupor and toast humankind, the bugs who are about to become extinct, others look at this dismissal of humankind and perceive a scintilla of hope. Da Shi tries to circumvent this worrisome assessment of humankind when he drives those in the throes of hopelessness to some wheat fields in order to show them the persistence of the insect realm in an anthropocentric world which more often than not wills most of them to be eradicated. We read that these fields ‘were covered by a layer of locusts. Every wheat stalk had a few crawling over it. On the ground, more locusts wriggled, like some thick liquid’ (Liu, 2016, 421). *The Three-Body Problem* asks us to pause and contemplate insects, because ‘humans have used everything in their power to extinguish them: every kind of poison, aerial sprays, introducing and cultivating their natural predators, searching for and destroying their eggs,

using genetic modification to sterilise them, burning with fire, drowning with water', and still, 'the bugs have never been truly defeated' (Liu, 2016, 422). Their resilience in the face of annihilation leads us to consider if human civilisation too can persevere in the face of such an extreme bombardment on their kind. This sense of newfound hope is, however, built on sand. The Trisolaran quest to invade and quash the insect population of Earth is a form of what Rob Nixon defines as 'slow violence' (2011, 2). This is 'a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space' (Nixon, 2011, 2). It is like the unseen and piecemeal peril of DDT—but on a cosmic scale. One can therefore remain hopeful because the alien menace is invisible and remote, yet the human population are like butterflies in a kill jar who must await the ether (the arrival of the interstellar fleet) four and a half centuries down the line.

The need to exercise caution in the quest to find extraterrestrial life in the cosmos is further emphasised in the second book in the series, *The Dark Forest* (2008). In the introduction to the novel, we read of a brown ant beneath the dark firmament, who encounters a spider web in the course of its exploration. Despite the delineation of the ant as an absent-minded and primitive creature, due to its possession of a 'simple consciousness' and 'tiny neural network', it is, however, familiar with the risk the spider could present to its continued existence if it should happen to pluck one of its silken chords and be discovered (Liu, 2016, 6). Therefore, the ant 'carefully detoured around the sticky hanging strands, passing by the spider lying in wait, its legs extended to feel for vibrations in the threads. Each knew of each other's presence but—as it had been for eons—there was no communication' (Liu, 2016, 2). The cautious nature of the ant is further underscored when it then comes across a human in its foraging. This experience leads the ant 'to hesitate momentarily while deciding whether it ought to intrude into his line of sight. Instead, it changed direction and

started crawling parallel with the ground' (Liu, 2016, 2). This is due to the fact that 'the ant was sensitive to eyes, because their gaze meant danger' (Liu, 2016).

This parable of the brown ant and the spider raises a crucial question for readers. If an ant knows not to call attention to itself as a small creature in a shark-tank world, then how is humankind so blind to the peril attached to the exposure of the planet to the rest of the cosmos? In *The Three-Body Problem*, humankind is the ant who makes the fatal error of judgement in its communication with the extraterrestrial spider. Its audible pluck sent forth into the cosmos, causes the Trisolaran spider to open its eyes and observe humankind in earnest, as it inches along its interstellar spatial web Earthward, over the course of four and a half centuries. This ill-conceived decision to broadcast information from planet Earth into outer space is akin to a person who stands and shouts in the midst of a quiet street in the darkness: one after another the houses become illuminated, curious as to its source. Due to this cosmic clamour, it is as if humankind has found itself in the centre of an inverted panopticon, in which one cannot view the countless observers who now peer at the cradle of humankind, but they can behold us.

The Dark Forest reminds us that humankind is as naïve as the children in the tale of 'The Wolf and the Seven Little Kids' in their rash approach to the search for and contact with extraterrestrial life. In a similar vein to the kids, who do not heed a crucial piece of advice from their grandmother, namely, 'be on your guard against the wolf; if he comes in, he will devour you all—skin, hair, and all', Mike Evans proves it is not just children who need to be reminded of this moral not to interact with strangers, as he fails to realise the irony when he relates this tale to one of Trisolarans (Grimm, 2011, 18). We read that 'grandmother had to go out, so she left the children in the house, telling them they must make sure the door is shut and not to open it to anyone but her. On the road, grandmother met a wolf, which ate her, and

then put on her clothing and assumed her appearance' (Liu, 2016, 11). The tale concludes, of course, when the wolf finds the house and calls to the children, '"I'm your grandmother. I've come back. Open the door for me". The children looked through the crack in the door and saw what looked like their grandmother, and so they opened the door, and the wolf came in the house and ate them' (Liu, 2016, 11-12).

As a cautionary tale within a cautionary tale, this intertextual reference is an additional alarm about the hazards of a first contact scenario with an alien civilisation. In this scene, we see the heedless readiness of humankind to open the planetary door to the big bad wolf, under the illusion that it is Grandma, and thus a benevolent visitor to the little Earth house in the forest, only for it to enter and consume the children (annihilate the entire human population). It reinforces the fact humankind puts too much trust in the idea that efforts to find other complex lifeforms in the cosmos will be joyous, and not detrimental endeavours. Both *The Three-Body Problem* and *The Dark Forest* warn readers not to be deluded by the apparent inherent benevolence of an extraterrestrial civilisation. As Paolo Musso writes, 'the possibility that ETs, or at least some ETs, may be malevolent (the so-called NAH, Nasty Alien Hypothesis) cannot be excluded, and should be taken in consideration very seriously' (2012, 44). The declaration that aliens come in peace, could be nothing more than words of disguise transmitted to mask their true intent, much like the wolf in this fable conceals his true appearance in order to enter the house and eat the children.

In another effort to halt the extraterrestrial invasion of Earth in *The Dark Forest*, Luo Ji conducts an experiment, a 'spell' that broadcasts a position pattern for the location of another star, 187J3X1, relative to its fellows in an area of the cosmos at a safe remove from our own star (Liu, 2016, 246). The effect of the spell is catastrophic. A short period afterward, 187J3X1 is annihilated in a strike from another unknown extraterrestrial

civilisation, and is now ‘a nebula of debris’ (Liu, 2016, 512-513). The picture of cosmic civilisation illuminated due to this ruinous spell unveils a dark truth about the universe. While it underscores that the cosmos is not a black and lonesome desert bereft of all but one or two specks of life, this is, alas, not a cause for celebration, for it tells us that what life there is in the universe is unfavourable to all those who do not consider it prudent to remain shrouded in silence. To be detected in this universe, is to die. This is not to claim that all extraterrestrial civilisations are malicious, for there is no method to determine if another world is one filled with benevolence or malice—and therein lies the problem. As Luo Ji asks Da Shi, ‘even if I’m a benevolent civilisation, can I determine at the start of our communication whether or not you are also benevolent?’ (Liu, 2016, 518).

The concept of communication with other cosmic civilisations to determine whether or not one is hostile or amiable is as pocked with problems as the lunar landscape. Luo Ji tells Da Shi, ‘If you think I’m benevolent, that’s not a reason to feel safe, because a benevolent civilisation can’t predict that any other civilisation is benevolent. You don’t know whether I think you’re benevolent or malicious’ (Liu, 2016, 518). In addition, ‘even if you know that I think you’re benevolent, and I also know that you think I’m benevolent, I don’t know what you think about what I think about what you’re thinking about me’ (Liu, 2016, 518-519). Luo Ji calls this convoluted scenario ‘the chain of suspicion’ (Liu, 2016, 519). This crisis of calculation means that a pre-emptive strike on another star and its planets could occur before communication can resolve the situation. The risk to planet A trumps the decision not to attack planet B in the hope that it is a peaceful world. The option to communicate with a weaker cosmic civilisation is also not advisable due to the issue of rapid advancement. Luo Ji tells Da Shi, ‘I’m weaker than you, but once I’ve received your message and know of your existence, the chain of suspicion is established between us. If at any time I experience a technological explosion that suddenly puts me far ahead of you, then I’m stronger than you’

(Liu, 2016, 520). This means that ‘even though I’m just a new-born or growing civilisation, I’m still a big danger to you’ (Liu, 2016, 520). Thus, if ‘one, letting you know I exist, and two, letting you continue to exist, are both dangerous to me’ and ‘neither communication nor silence will work once you learn of my existence’, there is one option left on the table (Liu, 2016, 520).

This last recourse is a cosmic race to kill or be killed. It is not a choice based on moral principles, but rather an amoral vote for survival. We read that this universe can be interpreted as a ‘dark forest’ in which ‘every civilisation is an armed hunter stalking through the trees like a ghost, gently pushing aside branches that block the path and trying to tread without sound. Even breathing is done with care. The hunter has to be careful, because everywhere in the forest are stealthy hunters like him’ (Liu, 2016, 521). If one were to discover life elsewhere in the universe, whether ‘another hunter, an angel or a demon, a delicate infant or a tottering old man, a fairy or a demigod, there’s only one thing he can do: open fire and eliminate them. In this forest, hell is other people’ (Liu, 2016, 521). Luo Ji explains this is ‘the explanation for the Fermi Paradox’ (Liu, 2016, 521). This arose due to the physicist Enrico Fermi, who, in consideration of a cosmos full of extraterrestrials, once mused that ‘there has been plenty of time and opportunity for alien civilisations to communicate with us or to visit us, yet we see no evidence of their existence. Where are they?’ (Impey, 2011, 267). This failure to observe a phenomenon we perchance expect to has thus been called the Fermi Paradox. In *The Dark Forest*, we learn the cosmos is in fact vibrant with extraterrestrial life, but most choose not to make themselves known, because a hushed universe, is a safe universe. Where are all of the aliens? In this galaxy, most have made rational and responsible choices for their ensured survival. This is at odds with humankind, who, in this dark forest, ‘has built a bonfire and is standing beside it shouting, “Here I am! Here I am!”’ (Liu, 2016, 521).

If we return to *The Three-Body Problem* and its treatment of the Cultural Revolution, this epoch can be perceived as a microcosm of this dark forest universe. In describing the so-called utopian vision of Chairman Mao Zedong that led to the sanguinary Cultural Revolution, *The Dark Forest* underscores that the utopias of other galactic civilisations are also predicated on fear (of exposure and subsequent destruction) and (interstellar) violence in order to uphold their frail utopian curtains—the shields of silence that conceal and protect cosmic societies in this dark and crowded universe. Mingwei Song writes that 'the moral crisis manifested during Mao's revolutionary campaign finds its parallel in this cosmic vision of zero morality', a concept evidenced in their shared vision of utopian worlds built on foundations of terror and annihilation (2013, 97). *The Dark Forest* concludes with the threat of the mutual destruction of the two worlds of Earth and Trisolaris in this dark forest of a universe in order to deter the invasion and save humankind from obliteration. Luo Ji tells Trisolaris that he will cast another spell like the one that culminated with the destruction of star 187J3X1. However, 'unlike last time, the position will contain the transmission of Trisolaris relative to its surrounding twenty-nine stars. The sun will be a galactic lighthouse casting that spell, in the process, of course, also exposing the position of the sun and Earth' (Liu, 2016, 540). This ultimatum causes the interstellar fleet to retreat post-haste and set a course for elsewhere in the cosmos, and life on planet Earth can once more continue on in peace.

This initiative to quash the Trisolaran invasion is, however, short-lived. In the final book in the series, *Death's End* (2010), we learn that the 'Deterrence Era' sustained due to the threat of Luo Ji's spell survives from '2208-2270', a mere 62 years, at which point the Trisolarans decide to act and put an end to the threat of mutual destruction (Liu, 2017, vii). The 'gravitational wave transmitters' which would be used to broadcast the locations of the two worlds to the cosmos are demolished when six Trisolaran probes concealed in space

accelerate at ‘maximum power’ and smash into their three terrestrial loci (Liu, 2017, 190). The Earth is under the control of humankind no more. Just two months into this ‘Post-Deterrence Era’ in which the extraterrestrial invasion of the Earth is inevitable once more, we read that ‘Trisolaris no longer intended to exterminate human civilisation, but would create reservations for humans within the solar system—specifically, they would let humanity live in Australia and on one-third of the surface of Mars. This preserved the basic living space needed for human civilisation’ (Liu, 2017, 222). After the twelve-month period allocated for the ‘Great Resettlement’ of all of humankind, we read that ‘any humans found outside the reservations would be exterminated as invaders on Trisolaran territory’ (Liu, 2017, 224). This merciless treatment of humankind in the Trisolaran colonisation of Earth validates the idea that contact with an extraterrestrial civilisation ‘could be like Native Americans encountering Columbus. That didn’t turn out so well’ (Hawking, 2016, 15:01-15:14).

When the resettlement is completed, Australia contains the bulk of the human population, ‘4.16 billion’, compared to the ‘one million’ who are sent to live on Mars (Liu, 2017, 242). The Trisolarans tell those who are packed into Australia that ‘the flag of evolution will be raised once again on this world, and you will now fight for your survival. I hope everyone present will be among the fifty million survivors at the end. I hope that you will eat food, and not be eaten by food’ (Liu, 2017, 251). This declaration tells us that Australia is destined to become a *Hunger Games*-esque barbaric terrain in yet another microcosm of this dark forest universe in which it is kill or be killed in order to survive. In a similar manner to *The Hunger Games* series (Collins, 2008-2010), in which two children selected from each of the twelve factions are forced to compete in a battle royale death match until one child remains in the arena to reap the rewards for their violent ordeal, in *Death’s End*, the 4.16 billion children of Earth must also participate in a battle to the death in the

arena of Australia until there are but fifty million victors who can live in so-called comfort on the reservation with sufficient space and supplies.

This Post Deterrence Era also possesses a short lifespan (2270-2272) however, because, unbeknownst to Trisolaris, the fourth gravitational wave transmitter aboard the spaceship *Gravity*, survives the attack on its life which devastated its three terrestrial counterparts. Those aboard the spaceship deduce that, due to the attempted destruction of their ship, planet Earth must have also suffered similar strikes and must now be under alien occupation. This prompts *Gravity* to make the decision to initiate the universal broadcast, so that 'the judgement of death for both worlds spread across the cosmos at the speed of light' (Liu, 2017, 274). The activation of the universal broadcast means that 'the location of Trisolaris has been exposed—which of course means the solar system is exposed as well. The Trisolarans are running away' (Liu, 2017, 276). Humankind is now able to leave the reservations and return to their homes, but it is a bittersweet sense of triumph, because the dismissal of one extraterrestrial hazard to the planet has now been supplanted with cosmic peril, as the whole of the dark forest shall soon be alerted to the existence of complex life on Earth. In a similar vein to Trisolaris, Earth 'is now a place of death that everyone will want to escape from' (Liu, 2017, 276). We read that 'when Luo Ji had conducted his dark forest experiment, 157 years had passed between when he first broadcast the coordinates of 187J3X1 to the universe and when that star was destroyed' (Liu, 2017, 309). This is not, alas, the case for Trisolaris, which, in just 'three years and ten months', is eradicated (Liu, 2017, 315).

In order to survive a similar dark forest strike on planet Earth that could befall it either in the immediate or in the distant future in this amoral universe, humankind decides to relocate to a number of space cities hidden behind Jupiter, Saturn, Uranus, and Neptune,

which are referred to as the ‘Bunker World’ (Liu, 2017, 510). This idea that humankind could shelter and survive the impact of an attack behind the distant planets is, however, futile, for the dark forest strike launched against Earth that occurs sixty-seven years later (the Bunker Era lasts from 2333-2400), does not take the same form as those which put an end to both 187J3X1 and Trisolaris. The projectile sent Earthward has the appearance of ‘a slip of paper’, an object that ‘seemed harmless’ (Liu, 2017, 577). This article, called a ‘dual vector foil’, is, however, deleterious to the nth degree, as its purpose is to ‘collapse the space around the solar system from three dimensions to two dimensions. The result will be the complete destruction of all life’ (Liu, 2017, 564; 597). Once the dimensional strike has been activated, ‘the entire solar system begins to fall into an infinitely large flat picture: planet by planet, object by object, molecule by molecule, the Sun, Jupiter, Saturn, Venus, Mars, the Earth, and all humanity turn two-dimensional’ (Song, 2018, 115). In the *Three-Body Problem* series, what we witness is a shift from contact optimism to cosmic pessimism. The finale of the series is a final dark reminder that, the enormous darkness of this amoral universe will snuff out those candles that dare to flicker, so it is best to remain safe and sound in the box. If not, the cradle of humankind could shift from a three-dimensional animated world to a two-dimensional artefact.

6.3: Behold the Alien! Rendezvous With Extraterrestrial Life in *The Long Mars* (2014)

With the dawn of a plethora of vibrant and habitable new worlds that one can expand into and explore with a simple step in *The Long Earth* (2012), humankind determines to turn its back on its celestial fantasies, and does not now concern itself with the examination of the desolate and expensive to reach planets of outer space. In the words of Joshua Valienté, ‘with millions of earths available to us, who wants to go up into the cold, scorching emptiness in a spacesuit

smelling faintly of urine?' (Pratchett and Baxter, 2013, 375). It is not until an airship expedition encounters a break in this necklace of parallel worlds called 'the Gap', a cosmic accident that has created a vacuum in space where an Earth once was, that humankind is once more inspired to look up at the dark firmament and envision what, or whom, could be out there (Pratchett and Baxter, 2013, 368).

In the third book in the series, *The Long Mars* (2014), we at last encounter an expedition to another planet that is not another iteration of planet Earth. This is a quest undertaken by Sally and Willis Linsay and Frank Wood in order to search for sapient life across the Long Mars, where one can step from one version of the red planet to the next, much like with the chain of terrestrial worlds, 'and what it might—what it must have achieved' (Pratchett and Baxter, 2015, 150). While most of these worlds are arid dustbowls in which life cannot be sustained, there is the occasional world blessed with warmth and water on which one can find flora and fauna. These include shrivelled but robust Martian 'cacti', and enormous creatures 'like whales in a sea of dust' that have 'gaping' mouths and 'tubular' bodies reminiscent of the extraterrestrial sandworms in the novel *Dune* (Herbert, 1965), that inhabit the desert planet Arrakis (Pratchett and Baxter, 2015, 207). The crew dispatched on this Martian mission do not come across sapient life until after their traversal of over one point five million different renditions of the red planet. However, in a similar manner to *The Three-Body Problem* series, this first contact scenario does not end well for those who are involved.

The extraterrestrials that we encounter in *The Long Mars* are described as primitive beasts who are as far removed from humankind as can be. We read that they 'were nothing remotely like humans. They were crustaceans, a form familiar from other encounters, but in this particular evolutionary arena they had developed supple armoured bodies, long

manipulating limbs that held weapons: spears, bows perhaps', and 'Frank saw what looked like raised chitinous fists waving, even a spear thrown in futile threat into the air' (Pratchett and Baxter, 2015, 269). This particular world is also home to another alien phenomenon, in the form of 'a series of dark bands, slender, vertical, black against the purplish sky of this world. Monoliths. Five of them' (Pratchett and Baxter, 2015, 270). These alien artefacts are, however, inaccessible to the human crew, who 'tried every way they could think of to get close enough to the monoliths to record their surface images. But something was blocking their approach. If they flew in, or even if they landed and tried to walk in, they all suffered blinding, agonising headaches' (Pratchett and Baxter, 2015, 271). This is not the case, though, for the extraterrestrials, who the human crew witness 'rushing past the base of the monoliths as if they didn't exist' (Pratchett and Baxter, 2015, 273).

Willis decides to establish contact with these entities in an effort to persuade them to record the monolith inscriptions. In order to acquire their support, he proffers a present—one that will allow them to step to Martian planets other than their home world. The narrator states that 'it took some pantomiming for Willis, surrounded by spear-wielding, expert-hunter, six-foot-tall crustaceans, to get over what he wanted', but 'the crustaceans were fast learners. They quickly grasped the potential of the technology, and soon picked up the idea that in exchange for the magic Stepper box, all Willis wanted was for them to take his handheld camera as close to the monoliths as they could get' (Pratchett and Baxter, 2015, 276-277). In a similar vein to *The Three-Body Problem,* Willis does not consider the potential consequences for good or ill of this first interaction with an extraterrestrial civilisation, and nor does he pause to contemplate the impact that such a present could have on their world. In just one encounter, Willis has turned their world upside-down with a novel power. One of the aliens, we learn, 'came in for particular humiliation with the new tool' and 'was jumped on,

tripped, shoved, pushed over' (Pratchett and Baxter, 2015, 276). This embarrassment will be remembered—to the detriment of the human crew.

This initial interaction between the extraterrestrials and these representatives of humankind transplants the colonial hierarchies of the terrestrial world to an extraterrestrial locale, and thus underscores the assertion that first contact scenes in science fiction tend to recapitulate 'the encounters of the European "discovery" of the New World' (Fitting, 2000, 127). The aliens in the novel are described as 'primitive' natives; 'poor ineffectual technologically incompetent creatures' used to fulfil the needs of the human invaders, who would perhaps call themselves explorers (Pratchett and Baxter, 2015, 269; Jones, 2018, 365). The representation of the crustaceans as crude entities ignorant of the significance of what surrounds them, as evidenced when Willis bemoans, they 'have absolutely no idea what they're dealing with here. The monoliths are just a feature of the landscape to them', echoes 'the European understanding of indigenous people in a natural world they seemed to barely understand or know how to take advantage of' (Pratchett and Baxter, 2015, 273; Rieder, 2008, 22-23). This depiction of alien ignorance in the face of a brave new treasure implies Willis has the right to appropriate pieces of these Martian artefacts and take them back to Earth for the benefit of humankind, despite his absolute lack of a claim to these relics that comprise the cultural fabric of another civilisation—deceased or otherwise.

Willis is emblematic of the sophisticated Western imperial power whose mission is to civilise the native aliens and help them 'achieve the level of their superior civilisation', while also attempting to plunder their cultural artefacts, samples of the monoliths and copies of their inscriptions which are 'not meant' for the eyes of humankind (Vint, 2021, 64; Pratchett and Baxter, 2015, 272). In Willis, we see the self-same 'greed and acquisitiveness which motivated the European voyages of discovery' (Fitting, 2000, 127). This advancement Willis

promises comes at a price, however, as the aliens are a pawn for him to get what he wants. The crustaceans must first consent to do what is asked of them from their benevolent human overlord, to 'record the monolith inscriptions', before receipt of their shiny new technological gifts (Pratchett and Baxter, 2015, 275). In order for them to do Willis's bidding, the aliens are civilised (bribed) with novel devices in the form of a stack of stepper boxes and survival suits, as opposed to civilised (coerced on pain of death) with 'maxim guns', the 'weapon most associated with imperial conquest' (Gilbert, 1997, 11). In *The Long Mars*, we note that the intrusion of humankind onto Martian soil sows discord between the native extraterrestrials, while the human crew are free to proceed with their expedition without issue and with a camera full of alien loot. The extraterrestrial suffers while the human prevails. This resonates with Sherryl Vint's point on the historical colonial adventure 'in which contact between civilisations of starkly different technological capacity spells disaster for one of them', in this case, one individual downtrodden due to the interreference of humankind on their planet (2021).

The human crew travel onward across iterations of the red planet and soon leave the world of the crustaceans and the monoliths in their wake. A covert pursuit is afoot, however, in the wrathful form of the alien humiliated because of the present bestowed on their world. The next time the crew land is to examine another ancient alien artefact that 'was the product of a long-vanished indigenous civilisation' (Pratchett and Baxter, 2015, 355). This article is a 'space elevator' or 'beanstalk' (Pratchett and Baxter, 2015, 349). In a similar vein to the monoliths, Willis also intends to exploit this alien structure and steal a part of it to take back for the benefit of humankind, and to hell with any potential aliens in the area for whom this could be a crucial or perhaps hallowed construction. Willis tells his companions (who have no choice in the matter, as he is the leader of this colonial-esque expedition) 'we came here for that damn space elevator. We ain't going home without a piece of it. Got that?' (Pratchett

and Baxter, 2015, 363). Both Willis and Sally descend to the root station of the space elevator miles below the Martian surface to retrieve a sample of the cable material, while Frank remains atop with their spare aircraft and cache of supplies. This is the moment that the crustacean that has tracked them to this world makes itself known and wreaks havoc on these human interlopers who have made him look a fool in front his peers.

The first clue of an attack appears when a piece of the spare aircraft falls down into the pit of the root station, which leads those below to depart for the surface post haste. When the aircraft bursts forth from the pit, it is met with 'chunks of wrecked glider scattered all around' and 'scattered bundles of gear, food, water, blankets, clothing, bits of comms and science gear' (Pratchett and Baxter, 2015, 372-373). In the midst of this sea of ruin is the dishonoured alien and his aura of 'obsessive murderous rage' (Pratchett and Baxter, 2015, 375). While Willis remains aloft in an attempt to draw him off, the others decide to split up on the ground to try to recover as much of their stuff as possible from the wreck and wear their attacker down prior to their escape, but the alien is relentless in its pursuit. There is just time to rescue one of them, Sally, while the other, Frank, is destined to become the victim of this resentful alien. Willis and Sally are helpless, and must watch on as the crustacean launches himself at Frank with his spear, which 'slammed into Frank's faceplate, shattering it. The noise of Frank's ragged breathing cut out of the comms link immediately, and he shuddered and toppled back' (Pratchett and Baxter, 2015, 381). *The Long Mars* thus ends with the sustenance of the trope of the evil extraterrestrial from whom all must either flee or be annihilated, despite the fact that it was their planet that the human crew invaded and they who caused the inter-alien strife. While it appeared that for once the alien could succeed in its retribution inflicted on humankind, two are able to escape his wrath and return to Earth with their prized alien loot, so the Western imperialist power (surprise surprise) is the victor once more.

6.4: An Invitation to Join the 'Galactic Club' of Cosmic Civilisation in *The Long Cosmos* (2016)

In *The Long Cosmos* (2016), we are presented with a different sort of alien encounter, in which we witness how the terrestrial search to find complex life elsewhere in the universe is displaced with its detection of intelligent life on planet Earth first. While in *The Long Mars*, humankind raced to find the alien, here it is an extraterrestrial civilisation who has found us first in this cosmic game of hide and seek. In this narrative, all of the inhabited stepwise worlds receive a communication transmitted from elsewhere in the cosmos, a 'message from the sky' in the form of an invitation to 'JOIN US' (Pratchett and Baxter, 2017, 8-9). This request is not just for humankind, however, as the broadcast is received across all of the sapient communities that inhabit the stepwise worlds—from human to troll to traverser, 'wherever there were ears to hear and eyes to see and minds to understand' (Pratchett and Baxter, 2017, 13). The radio transmission from outer space that has washed across the stepwise worlds is in a format that recalls a palimpsest—with one level of information inscribed under another. The 'surface level' of the broadcast is the initial welcome in the form of the invitation, while the 'level further down' is what we can describe as a form of instruction manual, an 'alien vision' of how to join this 'Galactic Club' of cosmic civilisation (Pratchett and Baxter, 2017, 121; 444). The how of the matter is a blueprint for the construction of a complex machine. However, the intent of the extraterrestrials behind this appeal to join them and the purpose of this object remain undisclosed, and we thus cannot determine whether this is some form of benevolent embrace into the bosom of cosmic civilisation, or a cruel cosmic trick that will somehow obliterate the necklace of parallel worlds and their inhabitants like a line of firecrackers.

The drawn-out decision about whether to respond and accept the invitation and fulfil its vision on behalf of all of planet Earth, or whether it should be rejected with the same caution as a suspect parcel with an unknown sender and no note of explanation, emphasises that alien first contact scenarios are a double-edged sword that could have favourable or disastrous consequences for the entire planet, or in this case, planets, and so it is prudent to be cautious about how to proceed. As the GapSpace worker Dev Bilaniuk puts it in the narrative, 'an interstellar message? Upside, *Contact*. A glorious galactic future. Downside, *A for Andromeda*. Enslavement and extermination' (Pratchett and Baxter, 2017, 122). The predominant part of the sapient population of the stepwise worlds are evident contact optimists, as underscored in their belief that 'we should accept this vision from the Galaxy with gratitude', and 'will not be so arrogant to assume it is necessary for such a superior race to seek our destruction' (Pratchett and Baxter, 2017, 129).

However, there is also a small pocket of vocal and active contact pessimists, who fear the invitation is a deception, and the alien machine could be intended to inflict harm on the terrestrial worlds, with such candidate catastrophes as a 'Trojan Horse' portal for an alien invasion, or a weapon of mass destruction, 'like a big bomb they're getting us to build to blow ourselves up' (Pratchett and Baxter, 2017).These disquietudes that the alien device is some form of trap, parallels concerns raised in the earlier science fiction novel *Contact* (1985), by Carl Sagan. In this tale, as with *The Long Cosmos*, the Earth receives a communication from elsewhere in the cosmos, in this case a series of prime numbers, that also contains a blueprint for an alien machine that humankind has to decide whether or not it is in their best interests to build. While most of the population are in favour of its construction, there are some, such as Stefan Baruda, who are suspicious of its purpose, as evidenced when he states, 'what if this machine is a Trojan Horse? We build the machine at great expense, turn it on, and suddenly an invading army pours out of it. Or what if it is a

Doomsday Machine? We build it, turn it on, and the Earth blows up' (Sagan, 2019, 163). In the face of an alien device with no indication of its intent, these anxieties are not unwarranted.

The widespread decision to build the alien machine in *The Long Cosmos* leads to a cooperative enterprise undertaken across the strands of sapient species that inhabit the stepwise worlds, who all arrive at the world specified in the blueprint (Earth West 3141592) in order to help realise the invitation. The machine is an enormous alien technoscape that, once constructed, is an aperture to elsewhere that allows a space pod nestled amidst its vast structure and populated with a select crew composed of humankind and an assortment of other sapient lifeforms such as trolls, to take a monumental step across interstellar space. This space pod—as with the extraterrestrial machine assembled in *Contact*—transports its passengers to the 'galactic centre', in which there is another chain of Earth-like worlds and concomitant selection of unusual lifeforms that include a world populated with various sizes of 'starfish covered in electric-blue fur' (Pratchett and Baxter, 2017, 421; 432). However, in contrast to *Contact*, whose human crew do encounter the entities that transmitted the communication and machine manual to Earth which resulted in their expedition to the heart of the universe (though with the outward appearances of humans with close relationships to each crew member), no such fantastical interaction occurs in *The Long Cosmos*.

There is no sapient welcome committee complete with banners and balloons on a planet at the centre of this particular cosmos, but still there is hope. The extraterrestrial civilisation that sent the invitation in *The Long Cosmos* provides us with an alternate perspective on sentient life in the universe, one that deviates from generically familiar, conventional notions of the alien as either the terrible Other who invades and marauds across the cosmos, or as the vehicle for the re-enactment of colonial fantasies of (human) dominance

and (extraterrestrial) subordination. Instead of the usual dulcet notes of cosmic fear, or of the human desire to quash and conquer that tend to be part and parcel of the alien first contact encounter, what we are presented with at the end of *The Long Cosmos* is the sense of a new dawn—a utopian future of cooperative cosmic existence between the inhabitants of the enmeshed necklaces of parallel worlds, as equal members of the 'Galactic Club' (Pratchett and Baxter, 2017, 444). *The Long Cosmos* allows its readership to envision a unified universe, a place that is a welcome departure from the traditional science fictional depiction of discord between human self and alien Other.

Chapter Seven

Video-Games as Visions of Tomorrow: A Video-Ludic Window into Worst-Case-Scenario Environmental Futures in *The Three-Body Problem* (2006)

7.1: Introduction

This chapter critiques the appearance and merits of *Three Body*, a virtual reality massively multiplayer online role-playing game (MMORPG) found in Part Two of *The Three-Body Problem*. Gordon Calleja writes that the notion of escapism 'implies a shift from one environment or emotional state to another one that is perceived as being more favourable' (2011, 136). This is a concept demonstrated in idealised and aesthetically pleasing video-ludic environments such as that of *Animal Crossing: New Horizons* (2020), in which one can amble around a simulated island and catch fish, chop wood, or harvest fruit, which can be sold to purchase items with which one can furnish one's little virtual piece of escapism, and not have to consider issues such as the concomitant environmental despoilation attached to said resource extraction, for all actionable elements of this virtual world are replenished in a short period. However, this chapter examines the way in which the delineation of *Three Body*, as an environmental dystopia within an environmental dystopia, subverts the idea of the magic circle and its associated escapism, in its counter to most video-games as 'pleasant abstraction from actual environmental realities in need of our conscious attention and intervention' (Chang, 2019, 40). Instead of entering into some form of picturesque Azerothian Narnia like in *World of Warcraft* (2004), *Three Body* presents readers and character-avatars with a desolate, speculative realist gamescape that could transcend its

computational existence should ecocidal acts continue to escalate and accelerate. This video-ludic environment is at risk due to the intractable and unpredictable interaction of its three suns, which cause it to either succumb to frozen tundra, or scorched earth, and to become a lifeless land in which civilisation must be reborn over and over. In this chapter, I interpret the environmental extremes of heat and cold encountered in the domain of *Three Body* as a digitally coded metaphor for the real-world climate crisis.

The domain of video-ludic environments is often associated with escapism from the real-world and its multitude of associated ills such as the climate or extinction crises. This is because these virtual worlds are delineated as bounded within what Johan Huizinga in *Homo Ludens: A study of the Play Element in Culture* (1944), calls a 'magic circle' (1949, 10). This is the 'supposed metaphorical line between the fantasy realms of virtual worlds and what we consider to be the real world', whose purpose 'is to protect virtual worlds from outside influences such as law, real-world economics, real-world money, and the like' (Fairfield, 2009, 824-825). This notion of the magic circle has, however, been exposed as a falsehood, for 'the complex and overlapping rhythms that crosscut everyday life do not stop at a magical barrier that contains and protects the game' (Moran, 2010). The intrusion of the real world and its concomitant (in this case—environmental) problems on virtual worlds demonstrates that the magic circle is not in fact an impermeable divide between the real and the virtual spheres, but rather a porous membrane in which real world issues can be mediated in addition to more frivolous quests. This is an important facet in the field of video-ludic ecocriticism, for, as Alenda Chang writes in *Playing Nature: Ecology in Video Games* (2019), 'games offer less didactic, less moralising, and therefore less off-putting ways to encourage people to consider environmental problems and their solutions' (15). On the one hand, then, virtual worlds offer pleasurable and immersive distractions from quotidian life, and on the other hand these cultural artefacts are able to surpass the realm of entertainment in order to do

serious work—to prompt us to become better environmental citizens poised to save the planet from environmental collapse in both virtual and real loci. It is therefore imperative that we acknowledge and celebrate video-ludic recreation as a crucial part of a cultural response to the environmental crises of the present epoch.

There have been multiple criticisms of video-ludic recreation. It is a cultural form that has hitherto either been deemed irrelevant or contemptible; 'ridiculed as a harmless waste of time for nerds, or put to the pillory as a threat to moral integrity' (Dürnberger, 2014, 231). However, these usual criticisms levelled at video-games have been countered of late with more favourable attitudes that extol video-luddism and the possibilities offered due to this interactive and immersive medium. In Chang's words, video-games have the 'potential to create meaningful interaction with artificially intelligent environments, to model ecological dynamics based on interdependence and limitation, and to allow players to explore manifold ecological futures—not all of them dystopian' (2019, 16). Ursula Heise likewise points to the importance of video-ludic recreation and its power to address environmental ills and affect environmental consciousness when she writes that we do not have to be in the thick of nature *per se* in order to develop a better relationship with the environment. In addition to 'the valuation of physical experience and sensory perception', Heise argues that 'an eco-cosmopolitan approach should also value the abstract and highly mediated kinds of knowledge and experience that lend equal or greater support to a grasp of biospheric connectedness'—such as that afforded due to video-ludic exploits (2008, 62). Donna Haraway has also noted her support for ludic recreation as an instrument of transformative power, as shown in her remark that 'perhaps it is precisely in the realm of play, outside the dictates of teleology, settled categories, and function, that serious worldliness and recuperation become possible' (2016, 23).

The advent of eco-aware video-games such as *SimEarth: The Living Planet* (1990) demonstrates that video-ludic worlds can be a potent medium used to foster environmental citizens. This is because these virtual worlds are instruments that 'make it possible for users to understand the consequences of even minor changes in one variable for the system as a whole, and thereby enable an understanding of global ecology that is very difficult to attain through direct observation and lived experience' (Heise, 2008, 62). With *SimEarth*, one must take control of the development of a planet from its birth until its death in a sustainable manner in order to avoid the destruction of civilisation due to a plethora of environmental crises that include increased temperatures that cause all of the water to boil off and life to become extinct. In this video-ludic world, one can activate various events such as meteors or volcanoes as tools with which to mould the landscape or alter the composition of the atmosphere.

However, these occurrences can also cause less than desirable side effects to the virtual planet of the game, such as mass extinctions. The use of meteors on the earth to spawn lakes, will spew dust into the atmosphere, and the *SimEarth* manual tells us that 'too much dust in the air blocks sunlight, which will kill plants (biomes), which will kill animals' (Bremer, 1990, 30). In a similar vein, if one were to use volcanoes to create islands somewhere in the ocean of this video-ludic world, we learn that this will add dust and carbon dioxide to the atmosphere and cause tidal waves, which 'can kill land life near the coasts' (Bremer, 1990, 30). *SimEarth* is a simulation of environmental actions, and more importantly, their consequences. Games such as *SimEarth* act as mesocosmic arenas in which one can replicate select aspects of the non-virtual world such as climate, evolution, atmospheric composition, or civilisation 'within environments that remain close to, but apart from life' (Chang, 2019, 21). These video-ludic worlds are carefully coded and simulated

interactive landscapes that enable us to experiment with and observe environmental 'what ifs?' and allow us to ruminate on how to turn this planet into a better one.

One of the most influential examples of a video-game replete with ecocritical discourse is *Final Fantasy VII* (1997). In this game, we, in the form of the main character Cloud Strife, are recruited as a member of the eco-warrior faction Avalanche, who are on a quest to rescue the planet from the evil corporation known as Shinra, who create electrical power from the forceful extraction of mako, the liquid energy that comprises the lifestream of the planet, and who profit from this industrial vampirism of its lifeblood. Their exploitation of the environment for mako leads to a withered and polluted world that cannot sustain flora or fauna, and we learn that if all of the mako were to be leached from its source and sucked up into mako reactors, the planet will perish. There is also another threat to the planet derived from Shinra in the form of Sephiroth, a soldier created in order to help Shinra achieve world domination, and who was the product of bio-experimentation—human cells combined with those of an alien creature called Jenova. When Sephiroth learns the truth about his birth, he descends into madness and summons a meteor with which he intends to obliterate the planet. In our immersion in this virtual world on the brink of environmental collapse, we are invited to empathise with the planet as it 'screams as if to say… I hurt, I suffer' (SquareSoft, 1997). However, in addition to this more observational experience of a world in its death throes, in our role as player-characters who spend a considerable amount of time in this virtual landscape, we have a stake in this world, and it is we who are responsible for its survival. *Final Fantasy VII* is an effectual example of the transformative potential of video-ludic recreation. It demonstrates that one individual can make a difference to the fate of the planet—a point that one can hope will result in reflection on the precarious situation of our own world, and to contemplate measures that we as individuals can take in order to effect positive change on our own non-virtual world in crisis.

7.2: The Climate Crisis and the Permadeath of the Planet in *The Three-Body Problem* (2006)

Video-games such as *SimEarth* communicate the dire consequences of issues such as the climate crisis in placid text boxes that alert us, for instance, to the fact that the 'sea level is rising as the icecaps melt' (Maxis, 1990). *The Three-Body Problem*, however, evidences the way in which video-games designed to be played in virtual reality allow one to experience those crises on both a visual and physical level, and frames them as immediate in time and space, so that bland one-dimensional information becomes an urgent three-dimensional scenario. In order to enter the virtual world of *Three Body*, one must first don special electronic equipment in the form of a 'v-suit and panoramic viewing helmet' (Liu, 2016, 119). The v-suit enables one to 'experience the sensations of the game: being struck by a fist, being stabbed by a knife, being burned by flames, and so on', and 'it was also capable of generating feelings of extreme heat and cold, even simulating the sensation of being exposed in a snowstorm' (Liu, 2016, 85-86).

We see this video-ludic realism in Chapter Seven, when Wang Miao first logs into the inhospitable landscape of *Three Body*, and we read that 'the compressors in the v-suit whirred to life, and Wang could feel gusts of cold air against his body' (Liu, 2016, 101). The creation of his in-game avatar further reinforces the notion that Wang is actually there, as virtual avatars 'offer the opportunity not only to be visually surrounded by the representational space, but also to move and act within it' (Calleja, 2011, 17). This total immersion is a unique affordance of video-ludic worlds, that provides one with 'a different perspective, as a participant, in the world in which a story is told compared to films or novels, which can only offer the perspective of an observer' (Milburn, 2018, 196). This immersion, offered within the gamespace, ascribes more responsibility to the player, as we witness the virtual

inhabitation of an environment through the lens of the player-character, and therefore provide the player with 'a view of the game world through the avatar's eyes', as opposed to a substantially more distanced, and two-dimensional representation of, and involvement within, a digital landscape (Calleja, 2011, 60).

Once he has entered *Three Body*, Wang encounters a non-playable character (NPC) named King Wen of Zhou, who tells him that this is a world dominated by two environmental extremes, a world in which the development of human civilisation depends on an unpredictable sequence of 'Stable Eras' and 'Chaotic Eras' (Liu, 2016, 103). At present, the planet is 'in the midst of a Chaotic Era', in which familiar patterns from the real world that are presupposed, such as the diurnal movements of the sun, are incertitudes (Liu, 2016, 103). King Wen explains that 'it is morning. But the sun doesn't always rise in the morning. That's what a Chaotic Era is like' (Liu, 2016, 103). In a similar vein to the 'shooter' and the 'farmer' hypotheses mentioned earlier in *The Three-Body Problem*, in which certain entities mistake the whims of their world for unalterable laws of the universe—delineations of patternless worlds that reinforce that the universe is an unpredictable area in which the welfare of humankind and the rest of the planet are not constants—this tumultuous video-ludic world further critiques perceptions of the Earth as a constant and enduring sphere that will never be subjected to major catastrophic alterations (Liu, 2016, 76). In his inclusion of this video-game in *The Three-Body Problem*, Cixin Liu subverts accepted knowledge of planetary routines in the real world by offering readers yet another set of fictional possibilities. This is a planet in which a trio of visually distinct and whimsical suns that can arise from any direction, either as singular entities or all together, results in unforeseeable spells of night and day.

The first sun that Wang sees in *Three Body* bestows little heat on this virtual world, and is 'small and bluish in colour, like a very bright moon', while the second version to

materialise is so immense in size that it boils the earth, and we read that 'after just half of it rose, it took up at least one-fifth of the visible horizon' (Liu, 2016, 104-105). These discrepancies in scale accentuate real world anxieties about the climate crisis. The fluctuation in size between the initial, small-scale, cold-inducing sun, and its latter, gigantic, blistering counterpart, can be interpreted as a visual commentary on the fact that increased temperatures are not all that the climate crisis has to offer, as 'surprisingly, even record cold snaps may be a symptom of the warmup' (Asimov and Pohl, 2018, 78). In a similar manner to that encountered in *The Three-Body Problem* with the shooter and farmer hypotheses, both Isaac Asimov and Frederik Pohl likewise prescribe to the theory of a patternless universe, as evidenced when they define the processes that result in the climate crisis— as in *Three Body*—as 'chaotic' (2018, 80). They stipulate that a series of minor factors 'may wind up as having very large long-term effects. The usual way this is expressed is to say that even the flutter of a butterfly's wings in Mexico may result in a tornado in Missouri. Of course, it also may not. That's what chaos means' (Asimov and Pohl, 2018, 80).

John Timberlake writes that the use of the giant magnifies anxieties about issues such as the climate crisis when he states that 'shifts in scale are, arguably, a primal form of manipulation; children famously ignore perspective, to draw large those things which dominate their lived experience' (2018, 25). The prominence of the giant in science fiction landscapes 'is most frequently accompanied by a sense of precariousness or danger: the giant robot or mutant monster running amok, the crash-landing space-ship and so on' (Timberlake, 2018, 29). However, juxtaposed with these examples, in the gamespace of *The Three-Body Problem*, it is the scaled-up familiar that conjures a sense of alienation—further proof that contemporary new-wave science fiction does not need to depend on the stock-in-trade alien to communicate real world concerns.

The climate crisis motif of *Three Body* undermines misconceptions that video-games 'act as a social sedative, arresting the player's ability to think critically by providing the equivalent of highly calorific but nutritionally lacking junk food' (Krzywinska and MacCallum-Stewart, 2011, 355). While Nathan F. Sayre notes, 'one might venture the thought that humans can barely think at the scale of global warming, after all, we have never had to do so before', Will Wright, the creator of *SimEarth*, points out that video-games are able to make this sort of planet-scale cognizance possible (2010, 98). Wright states that video-games 'can take a lot of long-term dynamics and compress them into very short-term kind of experiences' (2007, 12:16). For instance, in *Three Body*, with its hyper-accelerated depiction of a planet-wide climate crisis, 'the game sped up the progress of time. A month in game time might pass in half an hour' (Liu, 2016, 107). It is due to this video-ludic potential to hasten time that one is able to experience the 'slow violences' that afflict the non-virtual world as 'immediate in time, explosive and spectacular in space, and as erupting into sensational visibility' (Nixon, 2011, 2).

While it is difficult for us to think far into the future, Wright argues that 'when you can give people a toy and they can experience these long-term dynamics in just a few minutes, I think it's an entirely different kind of point of view, where we're actually mapping, using the game to remap our intuition' (2007, 12:16). Thus, 'in the same way that a telescope or microscope recalibrates your eyesight', video-games 'can recalibrate your instinct across vast scales of both space and time' (Wright 2007, 12:16). This underscores that, in spite of previous criticisms, video-games are an important platform through which one can explore difficult topics in a more palatable, but impactful and nuanced, narrative mode. *Three Body* is therefore one potential answer to the question, 'how can we turn the long emergencies of slow violence into stories dramatic enough to rouse public sentiment and warrant political intervention?' (Nixon, 2011, 3). With the help of the video-ludic we can, because video-

games offer so much more than wearisome towers of factual data or two-dimensional pictures of what the climate crisis could look like.

The virtual world of *Three Body* does not just destabilise 'naturalized, unchanging foundational realities' such as sunrise and sunset, it further decentres anthropocentric attitudes that have resulted in environmental ruination (Foster, 2011, 319). The delineation of this gamescape as inhospitable due to exceptional extremes of temperature means that player-characters must exist in a diminished state, suspended between life and death in order to survive. King Wen tells Wang that 'civilization can only develop in the mild climate of Stable Eras. Most of the time, humankind must collectively dehydrate and be stored. When a long Stable Era arrives, they collectively revive through rehydration. Then they proceed to build and produce' (Liu, 2016, 108). This could be construed as an inevitable Darwinian adaptation to a severe futuristic landscape. It can also be interpreted, though, as an ecological procedure that has evolved in order to decelerate what, in *Silent Spring* (1962), Rachel Carson defines as 'the impetuous and heedless pace of man' (2000, 24). This practice of shrivelling and stowing humankind like a cache of raisins in warehouses dotted across the gamescape, exposes us to an extreme answer implemented by the planet in order to ration anthropogenic environmental devastation. The dehydration process signals a crucial shift from a species that compromises the environmental 'capacity for self-renewal', to a world that actively regulates human population and the growth of civilisation (Thornber, 2012, 13).

This fail-safe manoeuvre that the planet contrives in *Three Body* in order to protect itself and to keep humankind in check, recalls a similar scenario from *Final Fantasy VII*. In this video-ludic world that has suffered much environmental devastation, we learn the planet created five colossal and powerful creatures known as weapons. These weapons are the 'last line of defence for the planet. When the planet is in life-threatening danger, it will activate the

creatures known as weapons' (SquareSoft, 1997). The planet first spawned these entities when the alien known as Jenova fell to the earth, but were not needed, as Jenova was sealed up in the crater formed when the asteroid that held her crashed into the planet. Once this threat to the planet was quashed, the weapons were contained beneath the earth in that same crater, to await the next time the planet would be imperilled and the weapons would be called on to protect it once more. When Sephiroth summons the meteor with which he wants to annihilate the planet, the weapons are awakened.

However, because of the energy barrier Sephiroth erects over the crater, the weapons cannot sense his presence and do not attack him. Instead, they attack the cities of Junon and Midgar. These loci are where Shinra have their headquarters, and are the largest consumers of mako energy, and thus, perhaps, the greatest threats to the world that the weapons are able to detect. In addition to the weapons, the planet has another arrow in its quiver, in the form of a powerful spell it alone can use known as 'Holy'. Yet, before the planet is able to cast it, someone (in this case Aerith) must first pray for it. This spell is another ultimate defence that enables the planet to eradicate all it deems bad for its welfare, which could include humankind, and to preserve all it considers beneficial to it. Once we (Cloud) kill Sephiroth, who is able to shield himself from the weapons and to hold back the power of Holy, the spell can move to end the meteor that threatens the planet. However, this alone is not sufficient to stop it, and one of our fallen comrades (Aerith) has to command the lifestream to come forth from the planet and push the meteor back, which allows the spell to demolish it and save the planet.

In contrast to video-games such as *Minecraft* (2011), *Don't Starve* (2013), or the *Far Cry* series (2004-2021), that 'have adopted the language and structure of natural biomes', but in which the landscape and its flora and fauna exist solely 'as resources to be processed into

accoutrements or "experience points" (XP) for the user's character', game biomes that 'would be more precisely classed as anthromes, given that their express purpose is to support player activity', the *Three Body* gamescape makes both its NPCs and player-characters weaker, rather than incrementally stronger (Chang, 2019, 8; Brown, 2014, 396). As such, *Three Body* provides both readers and its player-characters with a potent critique and eco-conscious alternative to games that depend on 'relatively simplistic environmental models, for instance, those of resource extraction (where the game world is primarily a source of building materials) or visual spectacle (where the game world is primarily a scenic backdrop to player action' (Chang, 2019, 6). P. Saxton Brown argues that the mechanics of such video-games are culpable of '"training" users to view environmental systems as infrastructures infinitely sustaining of growth' (2014, 398). However, in the domain of *Three Body*, in which the landscape is so barren that the only amenities to exploit are other human bodies that have failed to be placed in 'dehydratories', granary-like 'warehouses where the dehydrated bodies could be stored', both the player-characters and readers are prompted to reconsider their perception of and relation to natural objects and spaces; that is, to partake in a notably more ethical, and less instrumentalising relationship with the environment (Liu, 2016, 114).

Another player Wang encounters in *Three Body*, with an avatar named 'Follower of King Wen of Zhou', remarks that 'we've seen so many dehydrated bodies scattered along the road here. They've been torn, and won't be revivable even when rehydrated' (Liu, 2016, 102, 104). Follower subsequently inquires 'what does it matter if we burn a few of them? We can even eat some' (Liu, 2016, 104-105). However, this suggestion is swiftly met with a sentiment of abject horror, as King Wen of Zhou immediately interjects, 'put that thought out of your mind' (Liu, 2016, 104). When it is shortly thereafter proposed once more, King Wen further rebukes this notion when he exclaims 'stop with that nonsense! We're scholars!' (Liu, 2016, 105). This part of the narrative can be juxtaposed with prior instances in the novel that

compare human bodies with firewood in the Cultural Revolution, and trees as felled bodies during the mass deforestation that took place in the Greater Khingan Mountains. This raises an important question. Why is there a differentiation between any of these bodies? For what reason is it unethical to utilise this smattering of dehydrated human bodies as amenities for human subsistence, and yet it is deemed perfectly ethical to decimate every other entity and space as inconsequential bodies to be utilised for human advancement both within the digital sphere of video-games and in the real world? This humanisation of natural objects and spaces—and its antithesis—as witnessed in the objectification of these human husks further makes a case for the weight of populist cultural forms such as science fiction and video-games in forging improved relationships between humanity and the rest of the natural world.

While the dehydration mechanism can be perceived as a fictional method of controlling the collective ecodegradation caused by humankind, it also possesses real world resonance as a critical commentary on the need to curb the sizeable global ecological footprint of the human species, with particular emphasis on China as a case in point. As Vaclav Smil argues, 'we cannot find any better example of human impacts on the environment than those provided by China's long quest to accommodate its growing population' (2004, 142). Karen Thornber writes that 'these changes include everything from massive deforestation to sizable hydro-engineering projects such as canals, irrigation systems, and dams; from terracing of ever steeper slopes to technological developments that increasingly allowed Chinese to shape their environments' (2012, 35-36). In a similar vein to that expressed here by Liu, Asimov and Pohl also call for limitations on global human development, as they underline that 'the rate of repair is far slower than the rate at which we do the damage' (2018, 54). King Wen tells Wang that, when a Stable Era occurs, 'the king makes a decision based on intuition as to whether to engage in mass rehydration. Often, the people are revived, crops are planted, cities begin construction, life has just started—and then

the Stable Era ends. Extreme cold and heat then destroy everything' (Liu, 2016, 109). When the latest batch of humans in Wang's first venture into *Three Body* (Civilisation Number 137) become much too emboldened after their mass rehydration, they are subdued by a coldness 'pressed toward the earth like a giant hand' (Liu, 2016, 116). This quotation further evidences the dawn of an ecological revolution in which the planet quashes humanity, and so subverts anthropocentrism and its convention of paring down the natural world into something more manageable for human advancement.

When Wang comes back to *Three Body* in Chapter Eleven, a substantial amount of time has passed, as evidenced when an NPC named Mozi tells him that 'during the three hundred and sixty-two thousand years you've been away, civilisation has been reborn four more times' (Liu, 2016, 151). We learn that 'these civilisations struggled to develop through the irregular alternation of Chaotic Eras and Stable Eras. The shortest-lived one got only halfway through the Stone Age, but Civilisation Number 139 broke a record and developed all the way to the Steam Age' (Liu, 2016, 151). This civilisation was a much too industrial affront to this tenuous virtual environment. In its swift ruination due to another climatological horror (it remains up to the reader in this instance to envision whether the metaphorical hammer is one of ice or fire), Civilisation 139 can be interpreted as a nuanced commentary on the runaway trajectory of human advancement in the real world, in which the Industrial Revolution heralded the onset of what has become known as the Anthropocene epoch; 'the time interval in which human activities now rival global geophysical processes' (Steffen et al, 2011, 739). However, in the video-ludic world of *Three Body*, it is the planet that sets the limits to growth, as opposed to humankind. In this scenario, to describe the terms of this digital world with a scene from *Lord of the Rings: The Fellowship of the Ring* (1954), human civilisation is the Balrog encountered in the Mines of Moria, and the planet is Gandalf the Grey, stood in its path and shouting 'You cannot pass!' (Tolkien, 2003, 433).

The latest civilisation terminated due to extremes of temperature is Civilisation Number 141, which becomes a landscape of brilliant hellfire and falls 'into ruin in flames' (Liu, 2016, 160). This most recent annihilation is due to the appearance of a new, 'incomparably immense sun', that arises over the horizon like an enormous 'eye' that stops further development with its stare, and devours its tottering steps unblinkingly and unapologetically (Liu, 2016, 157-158). This trajectory of progressively substantial suns presents readers with the futurological crisis (or what Matt Hills defines as 'possible world' vision) of an infernal apocalyptic future, in its function as a further critique of the climate crisis (2011, 434). The visual horror of the suns as they balloon in size, exaggerates issues that Martin Dameris argues in the twenty-first century have been 'placed on the back burner in public discussions of climate change', as it helps to inflate what we cannot literally see—the slow creep of the climate crisis (2010, 489). As Steven Shaviro explains, 'the changing climate is what Timothy Morton calls a *hyperobject*: something that is indubitably real (i.e., not just a human projection), but that also exceeds, even in principle, our ability to grasp and comprehend it' (2018, 428). This being so, contemporary new-wave science fiction narratives like *The Three-Body Problem* enable writers 'to make the invisible visible', or, as Shaviro (quoting Gilles Deleuze) puts it, 'science fiction helps us to anticipate what is "real without being actual"' (Singh, 2018, 429; 2018, 428). In this case the impact of anthropogenic activities on the climate.

In Chinese folklore there is a tale, 'Nuwa Mends the Heavens', in which Zhurong, the God of Fire, and Gonggong, the God of Water, battle to determine the ruler of heaven. When the latter loses the battle, his wrath leads him to destroy Mount Buzhou, one of the four pillars that support the heavens. This 'plunged the world into catastrophe', as it led to multiple tears in the fabric of the sky, which started to drown the world (Yaming, 2015). In order to 'restore a happy and peaceful life to her people', Nuwa, the Goddess of Creation,

rescued the planet (before she died of exhaustion), while she held up the heavens with her back and the torrent poured down on her, in her efforts 'to patch up the sky' with 'five-colour melted stone' and the limbs of a slain tortoise which she used as 'pillars to firmly hold up the Heavens' (Yaming, 2015). However, just as it is in the world external to *The Three-Body Problem*, in which we transition between a real world riskscape and a virtual hellscape, there is no fabled intermediary to step in and save the planet. This is a truth we are reminded of in Chapter Eleven, as readers and player-characters must watch helplessly as the 'giant sun' in *Three Body* scorches its population of NPCs and animals 'like countless logs thrown into the belly of a furnace', until the gamescape mutates into an unquenchable 'burning carpet'—a digital deathscape (Liu, 2016, 158-159).

While 'we are never directly experiencing global warming as such', since we cannot directly experience climate, a phenomenon that is 'massively distributed in time and space', Lindsay Thomas points out that 'we can experience climate through mediation and abstraction, through things like climate models' (Morton, 2013, 48; 2016, 168). For instance, narrative, as a cultural form, can function as a 'performative model of climatic phenomenology' because narratives (whether video-ludic or novels etcetera) 'perform the experience of the climatic encounter' (Taylor, 2013, 3-4). That is to say, narratives, through the use of techniques such as metaphors or images, 'are technologies that enable us to think through the way in which one thing, concept, or idea corresponds to another', and permit us to 'conceptualize ideas, connections, and relationships that would literally not be possible without them' (Taylor, 2013, 4). In this case, the idea of a planet lost to the scorched world arc of the climate crisis. As Andrew Milner, JR Burgmann, Rjurik Davidson, and Susan Cousin note, 'treatments of catastrophic climate change in both print and audio-visual media have tended to be organized around three main tropes: the new ice age, the burning world and the drowned world; or, more succinctly, ice, fire and flood' (2015, 17). The concept of

climate melancholia makes an appearance in Chapter Eleven, when the end of this particular day in *Three Body* transforms into night 'as though a pair of giant hands had pulled a black cloth over a world that had turned to ash' (2016, 160). This quotation recalls the tradition of covering the deceased, and conjures the sentiment of 'complicated grief', (also known as 'prolonged grief disorder' or 'or persistent complex bereavement disorder'), associated with the 'loss of a loved one through death' (Crunk et al, 2017, 226). This is a form of 'acute grief' in which a person 'struggles to adapt to their loss', and believes only a desolate future lies ahead (Crunk et al, 2017, 226). The inability to process this strand of grief mirrors widespread global unwillingness to confront the realities of the climate crisis.

Wang re-enters *Three Body* for a third time in Chapter Fifteen, with the purpose of revealing 'the secret of the world', (and the objective of the game), which is to solve the supposed pattern of the movement of its three suns (Liu, 2016, 192). In his address to those seated around the table of the Great Hall in this new iteration of civilisation, he explains that he has hitherto 'witnessed the destruction of two civilisations, one by extreme cold, another by a blazing sun', and has seen 'the great efforts the scholars of the East expended in trying to master the laws governing the sun's motion' (Liu, 2016, 194). These previous methods used to determine the trajectory of the sun, such as 'through meditation, epiphany, or even dreams' are met with derision by the NPC named Galileo, who instead favours 'understanding the world through observation and experiment' (Liu, 2016, 194). However, Wang points out these methods too have formerly been tried, tested, and failed by other would-be problem solvers, such as Mozi in Civilisation Number 141. The observational model proposed by Wang, however, differs in one crucial aspect to its forerunners. It debunks the notion of one sun that has been expressed in the game up until this point, in favour of a multiple sun theory. Wang argues that 'the reason why the sun's motion seems patternless is because our world has three suns. Under the influence of their mutually perturbing

gravitational attraction, their movements are unpredictable—the three-body problem' (Liu, 2016, 195).

Whereas earlier in *The Three-Body Problem* the narrator describes the distinct nature of the suns that Wang encounters in his previous exploits in *Three Body*, this is the first time he actually verbalises his theory. Wang explains that 'when our planet revolves around one of the suns in a stable orbit, that's a Stable Era', but 'when one or more of the other suns move within a certain distance, their gravitational pull will snatch the planet away from the sun it's orbiting, causing it to wander unstably through the gravitational fields of the three suns. That's a Chaotic Era' (Liu, 2016, 195). Eventually, he concludes that, after an uncertain amount of time, 'our planet is once again pulled into a temporary orbit and another Stable Era begins. This is a football game at the scale of the universe. The players are the three suns, and our planet is the football' (Liu, 2016, 195). Galileo tries to undermine this notion of a cosmic tug-of-war, or planetary toing and froing, in his claim that no records of tri-solar phenomena exist. However, he receives a well-reasoned (but, alas, ignored) response from Wang that 'those who saw such a great sight could not leave behind any information about them because seeing three suns would mean that they had at most a few seconds left to live' (Liu, 2016, 197-198). The days marked (or rather, decimated) due to the appearance of three suns, Wang tells him, 'are the most terrifying catastrophes for our world' (Liu, 2016, 198). On the dawn of these tri-solar days, 'the surface of the planet would turn into a smelting furnace in a second, and the heat would be enough to melt rocks' (Liu, 2016, 198). In these battles of hell versus data, or furnace versus files, the flames of the stellar fire have no qualms licking all such historical records, and much of the rest of the contents of this video-ludic world out of existence.

In spite of his rational explanation for this virtual world, for which his reward is to be burnt at the stake, it is not until a harbinger of this actuality bursts into the Great Hall, and then into flames, that suspicions of its truthfulness start to surface, and do not have the opportunity to become a fully-fledged realisation, before swift annihilation ensues. We read that 'a horse dashed out of the light and into the Great Hall. Its body was already on fire, and as it galloped, the wind whipped it into a ball of flames' (Liu, 2016, 199). Its rider announces to those gathered within 'the world has ended! The world has ended! Dehydrate! Dehydrate!', while his horse collapses into a 'bonfire' beneath him (Liu, 2016, 199). In a continuation of the interpretation of *Three Body* as a commentary that hyper-accelerates the real-world climate crisis, this intrusion conjures the image of a new, fifth horseman of the apocalypse, one that goes by the name of Climate Crisis, to join its comrades of Pestilence, War, Famine, and Death. When the dust from this hellscape settles, the standard textual synopsis of its collapse appears on-screen to alert us 'Civilisation Number 183 was destroyed by a tri-solar day' (Liu, 2016, 201). However, in contrast to Wang's previous adventures in *Three Body*, after this particular episode, additional text appears on-screen telling him he has now deduced sufficient information about this digital world, which is to say, 'revealed the basic structure of the universe' (its tri-solar state) to level up (Liu, 2016, 201).

The second level of *Three Body* in Chapter Seventeen witnesses the seeds of civilisation blossom once more, and all are still attempting to 'master the pattern of the motion of the three suns', this time with the use of a 'human-formation computer' to perform calculations (Liu, 2016, 224, 235). Yet, as in each of the previous civilisations, the success of this latest predictive campaign is short-lived, and disaster befalls this world again with the advent of all three suns for the second civilisation in a row. The method of destruction is a little different this time, however, as 'Civilisation Number 184 was destroyed by the stacked gravitational attractions of a tri-solar syzygy' (Liu, 2016, 242). As such, rather than the

‘mere’ incineration as in the previous occurrence of a tri-solar day in Civilisation Number 183, a new form of tri-solar annihilation manifests here in which ‘everything on the surface of the *Three Body* world rose toward the sun’ (Liu, 2016, 241). Not only did the world become ‘pitch black’ and devoid of sound due to the lack of atmosphere, we read, but its inhabitants now experienced another (more grotesque) form of death outside of the standard routine thus far of death by fire or ice (Liu, 2016, 242). The narrator states that ‘as the bodies drifted, their blood boiled in the vacuum and their inner organs were vomited out, until they turned into strange blobs surrounded by crystalline clouds made from the liquid they exuded’ (Liu, 2016, 242). These human impressions in the sky are then transformed ‘into a giant vortex, spiralling toward its final resting place: the sun’ (Liu, 2016, 242). As each climate crisis passes by, we note that they become more and more extreme, gradually becoming less and less survivable. This mirrors our own reality, in that, the longer we delay comprehensive and substantial climate action, the more likely it is that the impending climate crisis will be unliveable. Much like the NPCs in the video-ludic sphere of *Three Body*, we too will become incapable of surviving in the climate of our own planet.

The player meet-up in Chapter Eighteen of the narrative results in the revelation that *Three Body* is not just a video-game, but that ‘the world of *Three Body*, or Trisolaris, really does exist’ (Liu, 2016, 246). This video-ludic environment has transcended the domain of the virtual into that of the real, and we discover it was created in order to evoke compassion for, and to communicate the predicament of an extraterrestrial civilisation and their planet, which is on the brink of annihilation due to the intractable and unpredictable interaction of its three suns. In its presentation of progressively worsening climatological disasters in an effort to depict this planet as unfixable, the video-game evokes empathy for this doomed world when players then become aware of the truth. There are a number of elements of *Three Body* that we find out are authentic delineations of the harsh environment of this alien civilisation.

In addition to the existence of its three suns, we learn the ability of its populace 'to dehydrate through its many cycles of civilisation is real. In order to adapt to the unpredictable natural environment and avoid extreme environmental conditions unsuitable for life, they can completely expel the water in their bodies and turn into dry, fibrous objects' (Liu, 2016, 247). *Three Body* also 'borrows the background of human society to simulate the development of Trisolaris. This is done to give players a familiar environment' (Liu, 2016, 248). The organiser of the meet-up explains the goal of *Three Body* is 'to gather those of us who have common ideals', and asks those present 'how would you feel if Trisolaran civilisation were to enter our world?' (Liu, 2016, 248). This prompts all bar two of the players to declare themselves in favour of an alien invasion, due to their belief it would allow the planet to recover from aeons of ecocide. The two who are opposed are then ostracized and deemed 'no longer appropriate players for *Three Body*' (Liu, 2016, 250). This underscores that the online and offline community of the video-game has strict filtration processes in place in order to determine those who will stand in support of the extraterrestrials when their interstellar fleet sets forth across the cosmos for Earth later in the narrative.

In Chapter Nineteen, the succession of civilisations in *Three Body* afflicted due to more and more severe environmental catastrophes reaches its climax. While Civilisation 192 is the most modern incarnation of this video-ludic world to date in the narrative, for it is the first to surpass the Industrial Revolution epoch and reach the Information Age, the sense of a planet still threatened with imminent death, despite this significant leap forward, remains. One of the NPCs that Wang encounters in this latest civilisation is an old man (Einstein) with a violin, who, despite the appearance of another new sun in this world, the portent of another catastrophe 'continued to play as though nothing odd was happening' (Liu, 2016, 252). This scene reads as a playing out of a planet irrefutably past the point of salvation, and thus recalls the eight musicians who continued to calmly play as the *Titanic* started to sink after its

encounter with the first of the three environmental extremes (ice) prevalent in narratives that confront the climate crisis (the other two, as mentioned earlier, are fire and flood). The new sun of this world, which does not behave like a sun, is in fact a 'moon' created due to yet another tri-solar disaster known as 'the great rip' that decimated the previous civilisation (Liu, 2016, 258). This was an unprecedented catastrophe in which 'the first sun shook the deepest geological structure of the planet; the second sun tore open a great rift in the planet that went straight to the core; and the third sun ripped the planet in two pieces' (Liu, 2016, 259). The moon of this world is 'the smaller piece' of the planet, and we learn 'there are still ruins from Civilisation 191 on it, but it's a lifeless world. It was the most terrible disaster in the entire history of Trisolaris' (Liu, 2016, 259). As such, the video-ludic world of *Three Body* has now metamorphosed into a geotraumatic space that is quite literally torn apart by environmental calamities.

Three Body further emphasises this concept of a terminal planet in its description of a colossal pendulum constructed in this version of civilisation. Pendulums are an important motif in this video-ludic environment. We first encounter them in Chapter Seven, as Civilisation Number 137 has an entire forest of these artefacts, so 'it was as though numerous giant clocks had been erected over the earth, or colossal, abstract symbols had fallen from the sky' (Liu, 2016, 110). These pendulums are kept in motion at all times, and were built on the counsel of Fu Xi, one of the NPCs, 'to have a hypnotic effect on the sun god and cause him to sink into a long slumber' (Liu, 2016, 111). It was hoped this would prevent further climatological catastrophes to befall this world, but alas, this farfetched idea of deliverance did not work. The lone pendulum we encounter later on in the narrative, Chapter Nineteen, in Civilisation Number 192, however, is built for another purpose, as a 'monument' for this world, and a 'tombstone' for 'an aspiration, a striving that lasted through almost two hundred

civilisations: the effort to solve the three-body problem, to find the pattern in the suns' movements' (Liu, 2016, 255).

This effort is now over, as the objective of the game, as we now know, is unsolvable, and all possible options to save this planet (from pendulums to mathematical models implemented and run on computers) have been exhausted. We read that 'Wang gazed up at the massive pendulum overhead. In the dawn light, it was crystal bright. Its deformed mirror-like surface reflected everything around it like the eye of the world' (Liu, 2016, 256). This comparison of the pendulum to an eye, an outward-looking object incapable of introspection, can be read as a critique of the widespread reluctance of humankind to confront the truth of the real-world climate crisis despite hard scientific evidence. This is what Per Espen Stoknes calls the 'psychological climate paradox', the fact that 'we know climate science facts are getting more solidly documented and disturbing year by year', and yet 'we also know most people either don't believe in or do not act upon those facts' (2015, 3). The world continues on much as normal, because, unlike what we witness in this video-ludic environment, which frames the climate crisis as an undeniable, terrible, and urgent 'now', in the non-virtual world, the crisis is a slow, overlooked, creep.

This video-ludic world is described as past the point of no return in Chapter Nineteen when we learn that there will come a catastrophe to this planet in the future to rival the disaster that tore it into two pieces. This is the prospect that the planet will eventually 'plunge into the fiery sea of the sun itself in just 'one thousand years' (Liu, 2016, 260-261). The world of *Three Body*, we discover, was once one of 'twelve planets', but now just this one remains. One of the NPCs, an unnamed secretary general, tells Wang that 'there is only one explanation: the other eleven planets have all been consumed by the three suns! Our world is nothing more than the sole survivor of a Great Hunt. The fact that civilisation has been

reincarnated a hundred and ninety-two times is only a kind of luck' (Liu, 2016, 260). The secretary general explains that the 'gaseous outer layer of the suns' was found to 'expand and contract over cycles lasting eons, like breathing' (Liu, 2016, 260-261). When this exterior section expands, it 'greatly increases the diameter of the sun, like a giant mitt that can catch planets more easily' (Liu, 2016, 261). Thus, 'when a planet passes by a sun at close range, it will enter the sun's gaseous layer. Friction will cause it to lose speed, and finally, like a meteor, it will fall into the blazing sea of the sun' (Liu, 2016, 260-261).

With 'one or two planets' consumed in each previous expansion, and the next one due to occur in one thousand years, the NPCs in this video-ludic sphere are faced with no other choice (except death) but to abandon their doomed world and set forth into outer space to 'find in the galaxy a new world to emigrate to' (Liu, 2016, 261). This is an emotive scene in the game for Wang, for when he realises there is nothing to be done to save this world from its final utter and complete heat death, his 'eyes blurred with tears' (Liu, 2016, 262). When Civilisation 192 is annihilated due to the appearance of twin suns at the end of this chapter, the in-game text informing us of its demise also tells us that 'the goal of *Three Body* has changed. The new goal is: head for the stars; find a new home' (Liu, 2016, 263).

Wang returns to the virtual world of *Three Body* for the last time in Chapter Twenty, in order to immerse himself in the final part of the game before the servers are shut down. In this end scene, the once desolate video-ludic terrain is crowded with NPCs, all of whom are 'gazing up at the sky' for the launch of the interstellar expedition, a fleet of one thousand ships destined for 'a star with planets about four light-years away' (Liu, 2016, 264-265). We read that 'Wang stood with them, silently gazing, until the phalanx of a thousand stars shrank into a single star, and until that star disappeared in the western night sky' (Liu, 2016, 266). In setting out to find a habitable place to live at the end of *Three Body*, and of course, in the

world outside of the gamespace, the narrative therefore positions its NPCs (and their non-virtual extraterrestrial counterparts), as extreme climate refugees resigned to leave their planet only after their exhaustion of all potential options to remain, as played out in the gamespace across nearly two hundred versions of civilisation. This concept of the extraterrestrial climate refugee is a concern that finds its parallel in real world contemporary environmental discourse. As Rick Noack writes, 'predictions for climate change-induced displacement range widely from 150 to 300 million people by 2050, with low-income countries having the far largest burden of disaster-induced migration, according to the Internal Displacement Monitoring Center' (2014). The interpretation of this civilisation at the end of the game as about to enter what Joy Sanchez-Taylor calls a state of 'Interplanetary Diaspora', further underscores the delineation of the video-ludic world of *Three Body* as a hyper-accelerated, speculative realist representation of the climate crisis slowly but surely occurring in real time on Earth (2017, 89).

This chapter has argued that video-ludic environments such as the one we encounter in *The Three-Body Problem* are not escapist fantasies, nor 'lowbrow popular indulgences, suitable only for frivolous-minded youth' (Chang, 2019, 10). Instead, it argues that these virtual worlds should be valorised as a potent cultural medium with which we can disseminate complex environmental issues such as the 'slow violence' of the climate crisis (Nixon, 2011, 2). In video-games such as *Three Body*, these concerns are metamorphosed into compelling and interactive (playable) experiences, which can in turn prompt reflection on the non-virtual natural world and its environmental ills, for, perhaps 'it is only by becoming more abstract, more estranged from nature, that we can make the cultural leap to thinking its fragile totality' (Wark, 1884, 127). *Three Body* can be interpreted as a novel take on the genre of the permadeath (permanent death) game. In its simplest form, permadeath is 'a game mechanism in which playable characters that die remain dead and therefore become

unplayable' (Chang, 2019, 213). In *Three Body*, however, instead of the permadeath of the player-character, what we have is the permadeath of an entire planet. In the real world, video-games in which we encounter the permadeath of a whole planet are few and far between, such as *Eco* (2018), in which, 'unless set otherwise by an administrator a looming meteor will annihilate the planet after thirty days, and the associated server will be wiped clean' (Chang, 2019, 223). *Three Body* is a video-game that is playable only once, for this gamespace is irrevocably lost once it has completed its run of civilisations and its servers are shut down. This 'never-to-return' death of the video-ludic environment reinforces the fact that *Three Body* is a game that confronts end-times: the collapse of a planet due to its extreme climate (Bartle, 2003, 415). However, it also ends with a beacon of hope that there is a better world out there; that our vision of tomorrow does not have to be so bleak, for, in contrast to this video-ludic sphere, the fate of our own planet is not pre-coded.

Conclusion

This thesis has argued that New Wave eco-science fiction has become an essential cultural instrument with which to understand and respond to our planet in an era of environmental crises. The first four chapters confronted issues that we face at present, in the here and now, in our relationship with the natural world, such as mass deforestation or the shared violence of women and animals. The latter three chapters, which centre on nanoscientific anxieties, the extraterrestrial contact debate, and video-games as visions of tomorrow, have also demonstrated the anticipatory nature of eco-science fiction, and its indication of how the actions of humankind could adversely affect the planet in the near or distant future. In this epoch, in which we are aware of the state of our planet, but unprecedented scientific consensus has failed to lead to action, I have shown that new modes of seeing the crisis that our planet faces, such as those offered in works of eco-science fiction, are of the utmost critical and political importance in the effort to ward off environmental collapse. These brave new worlds of green science fiction are a vital resource with which to draw attention to, and inspire calls to action on, the current state and future fate of our planet. Now, more than ever, as the climate crisis becomes more visible in our routine lives, science fiction is becoming greener as a means to help envision and understand what this means for the future of our planet.

However, it is not just science fiction that has become increasingly eco-aware since the publication of *The Three-Body Problem* and *The Long Earth* series. Mainstream literature has now (finally) moved to address more environmental concerns, with particular emphasis on the climate crisis. This is a term that has also, incidentally, experienced a metamorphosis since the start of this research project, with news outlets such as *The Guardian* announcing in 2021 that it was ‘changing the language it uses to talk about the environment, eschewing

terms like “climate change” for the more appropriately urgent “climate emergency”’ (author unknown, n. pag). One could argue that this motion in mainstream literature to confront environmental issues that were once raised in science fiction alone could alter the nature of what this thesis asserts about the relationship between environmentalism and science fiction. However, this movement does not mean that the importance of science fiction in this respect is now for the most part historical—a late nineteenth to early twenty-first century phenomenon. This is because, while mainstream works of literature with an environmental focus have started to appear, such as *The High House* (2021) by Jessie Greengrass, on the whole, mainstream fiction that examines eco-concerns is still nowhere near as prevalent as environmental science fiction. While both forms of literature will (inevitably) continue to expand as the ecological crises that face our planet wage on, I believe that even when mainstream fiction catches up with science fiction, it will continue to play a major part in our perception of environmental futures—if just for the sheer number of possibilities and planetary ‘what ifs’ that this genre offers readers.

The High House examines our failure to act on climate. In this narrative, routine life continues as normal, despite the fact that the seasons have started to fall into one another, so that one can find daffodils in the park at Christmas, or animals out of hibernation much too soon, and despite the inundation of news reports that have become the new normal, but which are tuned out like static. These are a slideshow of extreme weather events such as hurricanes, in which people have lost their homes and become climate refugees, or of failed monsoons in India, or fires that have decimated Australia. The worldwide situation progressively worsens until it becomes too late to make a difference to the outcome. There are unprecedented storms, and around the world islands and cities are flooded and lost to swelled rivers and bloated seas that do not recede. Francesca, a scientist and environmental activist, anticipates what is to come, and so builds an ‘ark’, a safe haven for her children that will be above the

new waterline, called the ‘high house’. Of course, this does not (alas) bring true salvation. It just means that her children are the last survivors, waiting for the end in an otherwise underwater world.

For this shift in mainstream literature to happen at last indicates that we have reached a crucial turning point, one in which the manifold environmental issues of our present epoch can no longer be ignored. This leads me to ask: —what has changed? I think the climate emergency has become more and more a part of our routine lives. In a similar vein to *The High House*, we are bombarded with news stories about extreme weather events across the world, the extinction crisis, the Great Antarctic Melt, and other disturbing phenomena. It is our inescapable present, and as such, we cannot tune it out. Since I started work on this thesis in 2018, the scale and rate of environmental catastrophes has become much worse. For instance, the 2019-2020 bushfire season in Australia was the worst on record, so much so that it has since become known as the ‘Black Summer’ (see Lu, 2022, n. pag). These fires burnt millions of hectares, and resulted in a substantial loss of wildlife, to such an extent that this period has been dubbed ‘one of the worst wildlife disasters in modern history’ (Readfearn and Morton, 2020, n. pag). It is estimated that ‘three billion animals were killed or displaced’ by this catastrophe, most of which are endemic to the continent, which means that some species and ecosystems may never recover (Readfearn and Morton, 2020, n. pag). The impact of the bushfires is also still making itself known, as new research has shown that smoke from the bushfires ‘caused a 1% loss in ozone – an amount that typically takes one decade to recover’ (Lu, 2022, n. pag). In 2022, we have witnessed even more unprecedented milestones. This April, Antarctic Sea-ice hit a new record low since recordkeeping began in 1978 (see Wang et al, 2022). This July, the UK recorded its highest ever temperature of 40.2°C (see Booth and Abdul, 2022). At the time of writing, one-third of Pakistan is underwater, as the country is in the throes of historic flash floods due to a monstrous

monsoon season, with over one thousand killed and more than 33 million displaced (see Sands, 2022).

Predictions based on current climate models about what the future will hold for our planet are no better. For instance, new research has shown that unless there are serious reductions in global emissions, the exposure to perilous 'Heat Index levels' (the combination of air temperature and humidity, which is how the effects of heat are felt on the human body), will 'likely increase by 50–100% across much of the tropics and increase by a factor of 3–10 in many regions throughout the midlatitudes' (Zeppetello et al, 2022, 1). This means that 'by 2100, many people living in tropical regions will be exposed to dangerously high Heat Index values during most days of each typical year, and that the kinds of deadly heat waves that have been rarities in the midlatitudes will become annual occurrences', which could in turn make vast swathes of the planet uninhabitable (Zeppetello et al, 2022, 1). But there is still hope, provided that we take more decisive action before we too, in a similar manner to the world of *The High House*, reach a point of no return. This was the consensus at COP26, the latest UN conference to tackle climate, held in October and November 2021. This critical event saw representatives from 194 countries consent to the Glasgow Climate Pact, an agreement that promises to 'accelerate action on climate this decade', and to 'keep alive the hope of limiting the rise in global temperature to 1.5C' as set out in the Paris Agreement—a legally binding international treaty on climate change which entered into force on the 4th of November 2016 (*GCP*, 2021, 3). However, these aims 'will only be achieved if every country delivers on what they have pledged' (*GCP*, 2021, 3).

The Glasgow Climate Pact underlined its objective to reduce global emissions, with the ambition of a net zero planet by 2050 (see *GCP*, 2021, 7). It called for an end to the use of coal power, because coal is the 'single biggest contributor' to anthropogenic climate change

(*GCP*, 2021, 9). 190 countries promised to phase down coal power and scale up their use of clean energy (see *GCP*, 2021, 11). There was also a marked commitment to protect precious natural habitats, with '91% of the world's forests covered by a pledge from 137 countries' to halt and reverse deforestation and land degradation by 2030 (*GCP*, 2021, 11-12). The need to speed up the switch to electric vehicles was also addressed, with 'more than 30 countries, 6 major vehicle manufacturers and other actors, like cities, setting out their determination for all new car and van sales to be zero emission by 2040 globally and 2035 in leading markets' (*GCP*, 2021, 13). In order to further curb emissions, the Climate Pact also included a section on methane. This saw over 100 countries vow 'to reduce their methane emissions by 30% in 2030', and 'includes six of the top ten methane emitters: the United States, Brazil, the European Union, Indonesia, Pakistan, and Argentina' (*GCP*, 2021, 15). These measures were coupled with a set of commitments to enhance efforts to deal with climate impacts, with more financial aid pledged in order to help increase the preparedness of the most vulnerable places (such as low-lying small island developing states) for climate risks, and to address, minimise and avert loss and harm, with vital funds for items such as 'flood defences' and 'drought resilient crops' (*GCP*, 2021, 22). Financial support from wealthier nations was also promised to enable other countries to transition from fossil fuels to clean power, improve conservation, etcetera, in order to be able to deliver on their climate goals (see *GCP*, 2021, 16-22). Now in this post-COP26 world, it is crucial that we see a move from climate commitments, to climate *action*.

This need to incite action and to deliver the planet from environmental collapse will (I believe) lead us to see more cultural and societal engagement, not just with the climate emergency, but with other critical environmental issues in the near future. While I have already discussed the upward trend in eco-conscious science fiction and mainstream literature since I started to work on this thesis, I have noticed that a marked shift has also started to

occur in other sectors. For instance, there has been an increase in eco-aware cinema releases, with notable films such as *Dark Waters* (2019). This is a powerful film based on true events set in motion in Parkersburg, West Virginia, in 1998, when a farmer named Wilbur Tennant asks for help from an environmental lawyer called Robert Bilott. Tennant takes Bilott a box full of video-tapes and photos—evidence that Tennant has collected that he claims proves that chemical runoff from a DuPont (a chemical production corporation) landfill next to his farm has poisoned his creek and is responsible for the deaths of most of his cattle, who drink from and cool off in these waters.

Bilott visits the farm and Tennant shows him further evidence of the issues he has observed in his cattle who have died—ballooned organs, blackened teeth, deformed hooves, and tumours. Bilott decides to take on the Tennant-DuPont case. In the box upon box of documents he receives from DuPont, a chemical named PFOA (also known as C-8) comes up over and over. However, this chemical is not on any of the EPA lists of regulated chemicals. Bilott asks a chemistry expert for help. The consultant tells him that PFOA stands for perfluorooctanoic acid, and that this chemical is what is known as a fluorocarbon, for it is made up of carbon and fluoride atoms. This leads Bilott to ask what would happen if one were to drink PFOA, and a lot of it, as he recalls seeing children with blackened teeth as he travelled to the Tennant's farm. Since the chemical contains fluoride, and too much fluoride will discolour teeth and can even turn them black, Bilott realises this case goes beyond what has happened to Tennant and his cattle, because PFOA is not just in the stream—it is also in the local drinking water.

Bilott returns to the sea of documentation sent over from DuPont and discovers that PFOA was used to produce Teflon and that it has thus infiltrated homes across America in the form of non-stick cookware. The documents also revealed that the Dupont staff who worked

on Teflon started to become ill with what was referred to as 'Teflon flu' (*Dark Waters*, 2019, 1:09:36-1:09:40). Dupont wanted to know the reason behind these illnesses, and so the corporation laced cigarettes with Teflon and asked their staff to smoke them. Almost all were hospitalised in this human experiment. This was in 1962, twelve months after Teflon had launched. DuPont knew that it was hazardous, but did not act because Teflon was too profitable. This is further reinforced when Bilott learns that Dupont knew about the research studies carried out at 3M, the corporation that first developed PFOA, but which stopped production. These were experiments that showed that rats exposed to PFOA developed enlarged organs or cancers, and that pregnant rats birthed pups with facial deformities. Dupont removed all of the women from their Teflon lines but did not tell them why, and a number of those same women went on to have deformed children. Bilott then finds out that millions of pounds of dust from Teflon manufacture was released into the air from smoke stacks at DuPont factories, and that toxic waste from Teflon was also dumped into the Ohio River and Chesapeake Bay, or tossed into landfills or open unlined pits at their production centres. What is more, PFOA was not used for Teflon manufacture alone. Since this chemical was an effective method with which to repel the elements (and in particular water), it was also used in the production of items such as paints and textiles. Bilott comes to the horrific realisation that the chemical PFOA is ubiquitous.

This is a serious cause for concern that has not and will not disappear, because PFOA is what is known as a 'forever chemical'. These are chemicals that do not leave the bloodstream and bioaccumulate over a slow period of time—and an entire population has been poisoned. Both Wilbur and his wife develop cancer, and Bilott talks with others in the area who have known someone who has died from certain forms of cancer. An independent scientific panel is set up to find if exposure to PFOA has led to increased incidents of disease in the six contaminated water districts. The first tests to detect PFOA in the blood of these

populations started in 2005, and 69,000 people were tested. Due to the sheer scale of data collected, it was not until 2012 that there were answers. It was at this point that the independent review reported that sustained exposure to PFOA was linked to six kinds of serious illness—kidney and testicular cancer, thyroid disease, preeclampsia, high cholesterol, and ulcerative colitis. When these results were first published, 3535 people already had these diseases out of the portion of the population who were tested, and lots more will have developed them since and will continue to do so. The result of this independent report was the decision that the entire affected class would undergo medical monitoring and that those who become ill with one of these linked conditions could then seek restitution.

While Dupont intended to battle each case in court (and it did, unsuccessfully, for the first three) in the end the corporation decided to settle all 3535 cases for $670.7 million. The film concludes with on-screen text that underlines the shocking scale of PFOA pollution, as we read that 'PFOA is believed to be in the blood of virtually every living creature on the planet, including 99% of humans' (*Dark Waters*, 2019, 02:01:32-02:01:37). Now 'there are growing movements around the world to ban PFOA and to investigate over 600 related "forever chemicals", nearly all unregulated (*Dark Waters,* 2019, 02:01:43-02:01:48). To see a cinematic film address a crucial issue such as this, amidst all of the action blockbusters and rom-coms, feels like a significant moment. It offers proof that important matters such as this are (finally) becoming more mainstream, and hope that we are starting to see a much more pervasive cultural response to different forms of environmental crises.

More recently, in addition to the welcome environmental turn in both literature and in film, a positive metamorphosis has been afoot in the education sector. In April 2022, the Department for Education published its Sustainability and Climate Change Strategy, with the vision that the UK will become 'the world-leading education sector in sustainability and

climate change by 2030' (SCCS, 2021, n. pag). The overall aim of this plan is to 'provide opportunities to develop a broad knowledge and understanding of the importance of nature, sustainability and the causes and impact of climate change and to translate this knowledge into positive action and solutions' (SCCS, 2022, n. pag). This inclusion of more climate literacy across the education sector is a much-needed step as we move forward with our collective efforts to save the planet. The measures laid out in this plan should help to foster a more eco-conscious population—one that can look to the future of our planet with a sentiment of hope, rather than despair. Ultimately, the texts addressed in this thesis and the trends observed in recent cultural artifacts show an increased societal awareness of, and desire to effect change upon, the ongoing environmental crisis. As the impact of such issues become more present and damaging in our day-to-day lives, we will continue to see an influx of eco-criticism across society, culture and academia.

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