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Imagining Humans in the Age of DNA:  
Genetics and Contemporary British Fiction

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## **Declaration of Originality**

I, Andréia Azevedo Soares, hereby certify that this thesis was written by me, except where otherwise acknowledged, and it is the record of a research project conducted by me within the Department of Humanities of Imperial College London.

## Abstract

This thesis examines to what extent modern genetics has influenced novelists to adopt a more deterministic view of human beings. It has been claimed that molecular biology, behavioural genetics and evolutionary psychology have challenged traditional ideas about humankind. My hypothesis is that if gene-centred disciplines changed the way we see ourselves, then this would have implications for the literary novel, a genre that depends greatly on representations of humans.

In analysing how genetics was incorporated in contemporary British fiction, I try to uncover the ways in which the human characters deal with – or are constrained or empowered by – scientific products or concepts. In addition, I seek to understand what novelists know and think about human genetics, and whether they believe it influenced their stories. Attention is also paid to novelists' relationship with scientists' cognitive authority. Specifically, I am interested in whether experts and scientific knowledge were positioned hierarchically above lay audiences and other forms of knowledge.

To answer those questions, extended semi-structured interviews and textual analysis were chosen as main research methods. Six literary novels were selected for analysis. This corpus consists of: A.S. Byatt's *A Whistling Woman*, Carole Cadwalladr's *The Family Tree*, Margaret Drabble's *The Peppered Moth*, Maggie Gee's *The Ice People*, Simon Mawer's *Mendel's Dwarf* and David Mitchell's *Cloud Atlas*.

The main conclusion of this project is that novelists are able to incorporate ideas about genetics in their texts without simply perpetuating reductionist discourses. Literary novels offer several advantages compared to the expository writing: they are a flexible literary form; deal imaginatively with the human experience; and effortlessly accommodate multiple perspectives, open-ended questions and complex ideas such as doubt and ambiguity. As such, this genre affords the opportunity to explore contemporary science as a provisional, contingent and socially-embedded endeavour.

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*To Pedro*

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## Introduction

The second half of the twentieth century witnessed a revolution in the life sciences. From the discovery of the molecular structure of DNA in 1953 to the completion of the rough draft sequence of the human genome in 2000, there were remarkable scientific breakthroughs that captured media attention globally and transformed the way we talk about genetics. Genes emerged both in popular culture and public discourse as a new source of anxieties regarding determinism, discrimination and perfectionism. They also emerged as a new source of answers for ancient (and yet crucial) questions about origins, identity, immortality and human potential. These social and scientific contexts naturally have an impact not only in our view of human nature but also in its cultural representations.

This thesis sets out to examine to what extent modern genetics has been influencing novelists to adopt a more deterministic view of human beings. By genetic determinism I mean that personality traits or behaviours are totally, or almost entirely, caused by genes (Nordgren 2003: 1145). As such, humans are regarded as sophisticated animals controlled by their evolutionary past. This mechanistic portrait of human nature implies a gene-centred view of evolution: the gene is the unit of selection, and gene selection is perceived as the key to understanding aspects of human behaviour such as altruism or violence. Conversely, a less deterministic view of human beings has its roots in humanism (Malik 2001a). It tends to reassert confidence in human capacities, presenting humans as exceptional beings, conscious agents able to transcend both genes and environment.

My approach will be to analyse six selected texts; they were chosen to represent a range of different approaches from thirteen recent literary novels dealing with genetics. My aim is to uncover the ways in which characters deal with (or are constrained or empowered by) scientific products or concepts. Specifically, I will try to explore how their journeys and outcomes in the narratives express ideas more related to human freedom or genetic determinism. Literary novels were selected according to the following criteria: all texts were written by British authors and published in the United Kingdom from 1997 to 2007; and they all touch in some way



on human genetic research or its medical possibilities. By design, this thesis focuses solely on human genetics. This means that, for the purpose of this study, I will not discuss genetic modification in plants and animals.

This analysis is supplemented by interview material produced specifically for this study. The data were collected by means of extended semi-structured interviews with six British authors: A.S. Byatt, Carole Cadwalladr, Margaret Drabble, Maggie Gee, Simon Mawer and David Mitchell. Interviews lasted between one and two hours (when in person) and were conducted in the authors' own homes in London (Carole Cadwalladr, Margaret Drabble and Maggie Gee), in an Edinburgh coffee shop (Simon Mawer) and via e-mail (A.S. Byatt and David Mitchell). They covered many aspects of their perspectives, experiences and objectives when writing the selected novels. The information gathered included authors' views of human nature and patterns of consumption of media products containing scientific information.

In this study, I will focus solely on contemporary literary novels. To limit the broad range of related genres in fiction, I will not consider crime novels and science fiction. Both are genres in their own right. Science fiction also constitutes, along with news media, the area of public knowledge that has received the most scholarly attention when the mediated dimension of public culture is investigated (Bates 2005). In contrast, little attention has been paid to contemporary literary fiction, a genre that has seldom been seriously considered as a vehicle of science communication (Russell 2007). Turney (2009: 166) believes that this 'lack of scholarly analysis may change, as the bulk of literary work which includes portrayal of science or scientific ideas is relatively recent'. My expectation is that this thesis can be part of the changing landscape.

Literary novels can be defined as fictional narratives of a certain complexity that deal imaginatively with human experience. The way contemporary novelists imagine humans gives us clues to understanding our culture's attitude to ourselves as human beings. The title of this thesis – 'Imagining Humans in the Age of DNA' – is an allusion to such mental pictures that are shaped by, and sporadically shape, the wider cultural agreement on what it means to be human. Since I am examining both novelists' discourse and their novels, these mental pictures allow a twofold interpretation: they represent the way novelists themselves envisage humans and also the way authors represent them in their literary texts. Do they see humans as exceptional beings, able to rise above their biological constraints? Or do they see human behaviour merely as a

product of gene selection? As to the ‘DNA’ in the title, the acronym is a reference to the molecule as a cultural icon (Nelkin & Lindee 1995). By ‘the Age of DNA’ I mean the cultural and historical context in which genetics succeeded as a prolific and influential scientific discipline.

This is an exploratory study. Exploration is the act of searching around a terrain for the purpose to discover information. I searched around the area where the spheres of genetics and literary fiction intersect each other. What I present here is a narrative about the data I was able to gather, analyse and interpret during my readings and field research. No social hypothesis can be drawn or proven from that narrative.

I see my work academically located in the field of science communication studies, even though the intellectual roots of my project lay in literary studies. I have also drawn on media studies and philosophy, history and sociology of science, where my focus is chiefly on popular representations of genetics, public understanding of biotechnology, bioethics and scientific theories of human nature.

The broad context for this study is the current intense interchange between science and literature. This is a double trend: on one hand, scientists are adopting a ‘literary approach’ when writing popular science books (Bucchi & Trench 2008: 10); on the other, novelists have been enthusiastically engaging with scientific ideas and metaphors not only in their texts but also in public events (Cassidy 2005: 127, Turney 2009, Waugh 2005). My interest in this relationship stems largely from the fact that novelists – as well as science journalists and other science communication professionals – act here both as producers and consumers of cultural products with scientific information. Novelists consume in popular science books what they tend to regard as scientifically certified knowledge. They draw inspiration from such books, among other sources, but critically and creatively edit and adapt scientific ideas to their own literary needs. They are not passive consumers. Nor they are uncritical messengers for scientific ideas.

There is nothing new in the expression of scientific culture through literature. From George Eliot to Ian McEwan, novelists have been doing this ever since the novel took its modern form (Amigoni 2008, Beer 2009, Haynes 1994, Levine 1988, Shuttleworth 1986). So why then pay attention to the way writers imagine humans in the DNA Age? Because it has been claimed that disciplines such as molecular biology, behavioural genetics and evolutionary psychology have challenged traditional ideas of humankind (Baillie & Casey 2005, Dupré 2001, Malik 2001a, Peters 2003). My initial

hypothesis was that if gene-centred disciplines were really changing the way we see ourselves, then this would have implications for the novel, a literary genre that depends greatly on representations of humans. If so, what stories are these novelists able to tell? And how have humans been represented in these narratives? How do these authors deal with scientists' cognitive authority and the associated rhetorical boundaries between science and society with which experts can protect their privileged status (Hilgartner 1990)? Do writers challenge such boundaries?

Human nature is now regarded as a scientific matter. Scientific knowledge has been integrated in an effort to understand human behaviour, something that was traditionally claimed to be an area of expertise of literary intellectuals (Hultberg 1997). One example of this was the famous debate between T.H. Huxley and Mathew Arnold over the movement for positioning natural sciences in 'the chief place in the education of the majority of mankind' (Arnold 2009 [1882]). In the dispute, Arnold suggested that there were values with which science was not equipped to deal – the understanding of the human condition was, then, understood as one of them. The literary intellectual argued that scientific knowledge could not give us insights into 'the constitution of human nature' (Arnold 2009 [1882]). Things have changed. Today novelists are feeding their explorations of human experience from scientific knowledge.

Contemporary gene-centred disciplines have an impact on the ways humans regard themselves. As much as Darwin's theory undermined the special status of humans by showing that all organisms are interconnected, genetics research is also shaking human perceptions of their perceived privileged position. Both allowed human beings to be explained in a materialist fashion. Genetics today raises the question of human nature by demonstrating similarities between us and all living things. Human genetic information has been calculated, summarized and interpreted. We have been witnessing the ascendancy of computational and cybernetic metaphors regarding the genetic code, suggesting that genetics became a matter of computing information (Keller 2000). In the cultural arena, genetic science messages have been helping to shape new ways of imagining and gazing at human beings (Anker & Nelkin 2003).

Scholars from different academic backgrounds regard recent developments in genetics as something that has serious effects in the way we perceive human nature. A theologian like Shannon (2005: 270) sums up the consequences in the following way:

‘HGP [Human Genome Project] has implications for our understanding of ourselves, our very human nature, and our relation to others with whom we share our genome, as well as those whose genome differs from ours by perhaps only three or four percentage points.’

A historian, Fernández-Armesto (2005: 164) argues that ‘the genetic revolution is already altering the way we think about what it means to be human, by nudging us as we drift into a materialistic conception of ourselves’. A gender scholar like Wexler (1996: xxiii) believes that ‘the new genetics has already opened a vast arena for contests of power over what it means to be human’. If not altered, the concept of human nature is at least being renegotiated.

Traditional values of humanism seem also to have been discouraged. By these values I mean the belief in humans’ capacity to both understand and control nature (including their own). Even though such values have been expressed in a number of ways over time, they were always buttressed by the notion that humans were conscious agents able to rise above circumstances through their own efforts. Humans were to be regarded as individuals who transform their surroundings and themselves. This vision of humans presented individuals as subjects rather than objects – and reinforced a sense of optimism about the human condition. Today humanity seems to be more pessimistic about its own nature and capacity: humans are envisaged more as victims than as agents (Malik 2001a, 2001b).

In his book *Man, Beast and Zombie*, Malik explores some reasons for such a sense of general disillusionment. As Malik (2001a: 7) puts it: ‘[t]he language of humanism no longer seemed adequate, and yet no new language seemed available to replace it’. The reasons for this are obviously complex. They are partly connected to the horrors of the first half of the twentieth century. It is impossible to disentangle our views of human nature from history. And twentieth century history, with its wars and atrocities, shows how ideas about human nature are not only fixed but can also be negotiated. The deliberate elimination of six million Jews in gas ovens helped to undermine the notion that humans are special creatures. Even though the Holocaust was clearly the result of particular social and historical conditions, its memory encouraged the idea that human nature was inherently violent and flawed. It became suspicious to regard humans as exceptional beings.

The current context of cultural pessimism and scientific materialism is not unrelated to the fact that genetics research and evolutionary psychology have come to dominate scientific studies of human nature (Dupré 2001, Jackson & Rees 2007, Malik 2001a, Peters 2003). Evolutionary psychologists have investigated what they perceive as key ingredients that made us human. Jared Diamond, for instance, argues that the roots of human evil sit in our evolutionary past. By establishing certain similarities between human and chimp social life, and relying on the genetic and evolutionary ties that unite both, Diamond (1991) claims that genocide is part of our biological heritage. The potential for war and mass murder has been presented as something lying within our very human nature.

Once we are more distant from political ideas of humanism, we tend to see ourselves less as agents and more as objects or victims, individuals whose behaviour or morals are determined by nature. Pessimism about the human condition, to advance one of my conclusions, can be found in the literary novels analysed in this study. Such depictions of disillusionment are significant to the extent that they partly express the ways in which novelists respond to, and reinterpret, current ideas of human nature.

In this thesis, the phrase ‘human nature’ is not used in a wide sense. This means that I am not covering ancient religious traditions, classic philosophical systems or general prescriptions that try to offer guidance for a happy human life and society. I am more concerned with recent studies that attempt to use science in order to have a better understanding of the human condition. In this study, the idea of human nature is used in a narrower sense to refer to distinctive scientific claims about human beings and their behaviour.

There is no single and fixed image of human nature. If we consider that views of human nature are historically and culturally dependent, it would be impossible to obtain a definite account of the human condition that holds true of people at all times and social circumstances (Kupperman 2010, Stevenson & Haberman 2009). The contemporary thinker Francis Fukuyama (2003: 130) defines human nature as ‘the sum of the behaviour and characteristics that are typical of human species arising from genetics rather than environmental factors’. The definition I adopt in this study is less restrictive, thus giving enough room to accommodate novelists’ diverse perspectives. I work with the notion of human nature as the sum of the behaviour and characteristics that are typical of human species. I also use the phrases ‘human nature’ and ‘human condition’ interchangeably to avoid constant repetition of words, as seen

elsewhere (Baillie & Casey 2005, Dupré 2001, Fukuyama 2003, Malik 2001a, Pinker 2002, 2011).

This thesis is concerned with the large area where science intersects culture. Science is a cultural tool of knowledge production – and it is as much part of culture as literature (Fausto-Sterling 2003). Science is therefore an expression of culture. This means that a better understanding of the cultural framework within which science is constructed requires an appreciation of our vision of humans. As Peters (2003: xiv) puts it: ‘[t]he kind of knowledge it [science] produces is born out of a cultural vision of human nature and human aspiration’. In exploring how genetics has been integrated into contemporary British literary fiction, I hope to provide a small contribution to the study of the wide cultural frame of science. Understanding how novelists imagine humans is significant because the way in which we regard ourselves helps to shape the science we, as a society, aspire to.

### **Genetics: a new form of preformationism?**

The argument behind this thesis builds on the idea that the new genetics has influenced contemporary views of human nature. It might be useful, then, to look at the struggle between the preformationist and epigenetic theories, which is one of the crucial elements in early modern biology. Looking back is important because contemporary genetics entails ideas and controversies reminiscent of this older debate. In fact, genetics brought a new form of preformationism (Maienschein 2012).

Preformation and epigenesis are two persistent attempts at explaining the development of organisms. In global terms, these competing philosophical traditions disagree over the following core issue: does an individual grow from unformed material, being progressively shaped over time (epigenesis), or does an individual start in a predetermined way (preformation)? These are the central assumptions of epigenesis and preformation but we should note that, through history, different formulations of each theory have been presented and debated. This means that each stage of the preformation versus epigenesis debate should be understood according to its author’s arguments and within its historical contexts. For the purposes of this study, I will concentrate on its general description and on the notion that contemporary genetics is reminiscent of preformationist ideas.

In the seventeenth century, William Harvey (1578-1657) was the ‘major voice’ in the field of epigenesis (Pinto-Correia 1997: 25). Harvey suggested the idea that germ cells contained indeterminate globs of matter produced by each organ of the human body. His view of epigenesis evoked the notion that germ cells carried ‘a protoplasmic version of the individual’ (Roof 2007: 155). In other words, Harvey believed that the organism was not yet complete in the fertilized egg. Important changes were required, both in shape and form, to ensure a successful and complete embryogenesis process. In the eighteenth century, Caspar F. Wolf (1734-1794) confirmed Harvey’s theory by the observation of the embryonic development of chicken eggs. It is important to note that the modern division between generation-to-generation heredity and embryology was then nonexistent; both were inextricably combined in the analysis of reproduction.

In opposition to epigenesis, preformation implied that a completely formed individual was inside germ cells only waiting to be born. Those who believed in preformationism claimed that a man in miniature – a ‘homunculus’ – was folded in a foetal position inside a sperm cell (Keller 1995). Pinto-Correia (1997) compares the central concept of preformationism with the Russian nesting dolls. Similarly to a ‘matryoshka’ structure, a tiny creature was said to exist inside every potential father. The mother’s egg would only offer the nourishment necessary for its growth. Although the homunculus has become a ridiculed icon of seventeenth century ideas, Pinto-Correia argues that preformation theory still has a critical influence on the modern view of conception.

Gould notes that the ‘triumph’ of epigenesis marked the beginning of modern embryology (Gould in Pinto-Correia 1997: xv). Epigenetic embryologists emphasized the dynamic process during which an organism grows within developmental contexts – this includes, for instance, environmental conditions or cell interaction. Nevertheless, in the twentieth century this sense of triumphalism petered out as a renewed preformationism arose in the form of genetics (Maienschein 2012). The notion that genes are instructed to carry the information of heredity, and that such a programme is alone sufficient to build an individual, became a popular and dominant view. This constitutes what Keller (1995) calls the ‘gene action’ discourse, a narrative in which there is a false separation between molecular genetics and developmental biology (embryology). In this new preformationist era, the problem of development was gradually overlooked. Or, as Robert (2004: xiii) writes, it was simply not taken

seriously:

‘To take development seriously is not to hide behind metaphors of the magical powers of genes – they ‘instruct’ or ‘program’ the future organism. To take development seriously is rather to explore in detail the processes and mechanisms of differentiation, morphogenesis, and growth, and the actual (not ideologically or perhaps merely technologically inflated) roles of genes in these organismal activities.’

Preformationist ideas are persistent. The current notion of genetic blueprint evokes the image of genes as tiny homunculi: humans are thought of as creatures fully predetermined by a biological plan (Keller 1995, Lewontin 2000, Roof 2007). As Lewontin puts it (2000: 6):

‘[T]here is no essential difference, but only one of mechanical details, between the view that the organism is already formed in the fertilized egg and the view that the complete blueprint of the organism and all the information necessary to specify it is contained there, a view that dominates modern studies of development.’

Even though Condit (1999a: 22) does not associate the homunculus imagery specifically with the blueprint metaphor,<sup>1</sup> she also considers that the new version of the homunculus has a ‘dangerous potential’:

‘Outside of Darwinism, popular Western discourse about heredity has also focused on God’s will in ways that can be taken to be deterministic and discriminatory. . . . Pre-genetic biological views also had this dangerous potential because they posited the homunculus, the little preformed man in the sperm who already had all his characteristics even before insemination (a dream which cloning unfortunately now revives and

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<sup>1</sup> In Condit’s view, the blueprint metaphor is ‘slightly less deterministic’ (1999a: 20) than others once it offers a new model of relationship between genes and environment. Condit argues that a blueprint provides only starting points to construct a building, the outcome of the construction will depend greatly on the materials and the professionals employed.



threatens to enact).’

This preformationist imagery reinforces the contemporary notion that ‘it’s all in the genes’, an idea that is part of the ‘growing myth of genetic determinism’ (Peters 2003: xiii). It also has implications for our view of human nature: if we are thoroughly programmed by genes, then we are deprived of freedom and agency.

### **From Mendel to the Human Genome Project**

It has been more than a century since the term ‘genetics’ was coined as a technical term by the British geneticist William Bateson (1861 – 1926), who used the word in a letter written in 1905 to the zoologist Adam Sedgwick (1854 – 1913).<sup>2</sup> Bateson used the term again one year later to describe ‘a new and well developed branch of Physiology’, that of the study of heredity and biological inheritance, during an international congress on botany (Bateson 1907).

The Austrian scientist Gregor Mendel (1822 – 1884) is considered ‘the father of the gene’ but his fame is posthumous. Although his meticulous experiments suggested the existence of ‘units of heredity’, he never used the word ‘gene’. Mendel, an Augustinian friar, discovered the basic laws of heredity whilst growing peas in his monastery garden in Brno in Moravia in the 1850s and 1860s. His work finally became prominent in the beginning of the twentieth century, when Hugo de Vries (1848 – 1935), Karl Correns (1864 – 1933) and Erich Tschermak von Seysenegg (1871 – 1962) rediscovered independently the laws that launched the new science of genetics (Keller 2000).

De Vries called Mendel’s units of heredity ‘pangenes’. In 1909, the Danish botanist Wilhelm Johannsen (1857 – 1927) added one more word to the biological vocabulary: the gene, a shortened version of De Vries’ ‘pangenes’. Francis Galton and other eugenicists continued to employ the term ‘germ-plasm’ and, until the mid-twenties, the word ‘gene’ was absent from discussions of eugenics in newspapers and magazines. In fact, it ‘was not dominant until the thirties and forties, when eugenics

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<sup>2</sup> A scanned copy of this epistolary material is available at The John Innes Centre site on the Internet: <http://www.jic.ac.uk/corporate/about/bateson.htm>.

as a public movement had clearly waned' (Condit 1999a: 6).

Genes can be described as units of DNA containing information for coding proteins. They come in pairs and are located at specific places in chromosomes, as first demonstrated by Thomas Hunt Morgan (1866 – 1945). Each one of us is supposed to have 23 pairs of chromosomes which in total have 20 to 25 thousand genes. In a Mendelian sense, genes are the units of heredity, functioning as drawers where evolutionary information is stored. The unveiling of the molecular structure of DNA in 1953 turned this idea into something more palpable: genes contain an archive and the records they keep explain how genes could generate genes. 'It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material', stated James Watson and Francis Crick in their famous *Nature* paper (Watson & Crick 1953: 737). Following a base-pairing rule, each DNA molecule produces precise digital copies of its unique sequence. And 'because the system is fallible, it allows evolutionary change' (Ridley 2003: 233).

As a 'new' discipline excised from developmental biology (Keller 1995), genetics needed to be presented as something fresh and completely detached from eugenics and its Nazi phantoms. Between the late 1950s and the early 1970s, therefore, scientists made concerted efforts to clean up the public image of genetics – Watson's best-seller *The Double Helix* (1969) being the best example of this new interpretative framework for the lay audience (Dijck 1998). Watson's autobiographical account of the race towards the description of DNA molecular structure was followed, almost two decades later, by Crick's own account: *What Mad Pursuit* (1988). Genetics was definitely turned into a field with popular appeal, thus paving the way to a literature on genetics dedicated to a wider audience (Roof 2012: 126). This trend was intensified in the 1990s, when the Human Genome Project (HGP) was officially established as an international venture aimed to map the distribution of genes on chromosomes (e.g. Ridley 1999, Watson 2004).

The excitement surrounding HGP encouraged critiques more focused on analysing ethical and social issues arising from the multi-billion-dollar project that promised medical breakthroughs on behalf of genetic research (Kevles & Hood 1992, Kitcher 1996, Rothman 1998). Such critiques should be understood not only as a warning against genetic determinism, reductionism, discrimination and the resurgence of eugenics via the backdoor (Duster 2003), but also as a response to the propaganda

and hyperbolic promises made during the 1990s, when Watson and others were gathering funds to launch the HGP (Leite 2006).

In the United States, for instance, the HGP required a vigorous lobbying movement to become an administrative and financial organization. Scientists such as Watson and Walter Gilbert were part of the team of lobbyists who made promises, using discursive tools such as analogies and metaphors, in order to persuade financiers to make the colossal investment needed to fund the project. Their essays published in the book *The Code of Codes* (Kevles & Hood 1992) clearly show that.

Watson (1992: 164-5) wrote in the early 1990s, when scientists were about to decode the ‘complete blueprint of man’, that he did not ‘want to miss out on learning how life works’ nor to find out that genes were being ignored in attempts to cure diseases. Watson (1992: 167) maintains his traditional gene-centred speech and writes that ‘it is still better to waste our money doing genetics because genetics lies at the heart of so much’. Therefore, U.S. congressmen had to be convinced that ‘the best use for their money is DNA research’.

Walter Gilbert, in his turn, chose to draw on ‘A Vision of the Grail’. The biochemist stresses how possessing the DNA sequence of a human being will alleviate human suffering, giving less attention to negative aspects that can arise from a reckless or unethical use of genetics. The study of the human genome is presented as a tool to not only ‘transform medicine’ but also enable the design of ‘individual drugs without side effects’ (Gilbert 1992: 94). In the last six paragraphs of his essay, Gilbert (1992: 95) addresses the ‘very strong social effects’ of genetic mapping. The scientist acknowledges the human fear of being enslaved or dictated by ‘genetic information’. However, this downside is presented as a ticket to ‘clearly understand how connected all life really is’ (Gilbert 1992: 97).

These fragments of public discourse about genetics remind us that scientists are not detached observers of nature (Hubbard & Wald 1997). As Rothman (1998: 14) puts it: ‘[s]cience doesn’t occur in a political or a social vacuum’. Science is shaped by (and shapes) social, political and economical circumstances (Knorr-Cetina & Mulkay 1983). Genetics is more than a set of scientific facts. It involves grants, business deals and particular social practices. It is an activity whose international projects have been funded in spite of other disciplines. It can be perceived as a route for controlling or predicting the future, curing diseases and uncovering evolutionary history. It is a way of imagining humans and explaining facts of daily life. As a

contemporary practice, it is also regarded by critics as a tool of biological determinism. These roles that genetics play in society are not constructed from nothing. They are partly pushed forward by a network of meanings fed by scientific, popular and public discourses. All these discourses influence, to varying degrees, our vision of humans. This thesis investigates a small but important part of this network: the literary discourses that inhabit the cultural frame of science.

### **Genetic discourses and determinism**

Contemporary advances in molecular biology added renewed substance to the millennia-old conceptual war over determinism. Researchers began to analyse – and often to decry – discursive tools used to promote genetics as a crucial discipline to alleviate human suffering and to unveil the essence of human life. Social sciences and discourse studies devoted attention to the analysis of DNA and genomic metaphors or images (e. g. Nerlich *et al.* 2002, Nerlich *et al.* 2004). Critics expressed, to varying degrees, a concern about the implications of genetic knowledge regarding biological determinism (Dijck 1998, Hubbard & Wald 1997, Keller 1995, Kitcher 1996, Lewontin 2001, Nelkin & Lindee 1995, Peters 2003, Rothman 1998). Many of those who have written about the representation of genes and the genome have argued that figurations can be confusing, ambiguous or politically oriented (Roof 2007).

The prominence of genetics as a discipline owes a lot to the adoption of the information metaphor (see Condit 1999a). This has had scientific, economic and political consequences since the concepts of ‘information’, ‘instruction’ and ‘programme’ were conflated into one single agency in the biological context. Keller (2000) argues that the discourse of ‘gene action’ attributed to genes powers beyond their real role in cell growth and, subsequently, drained funds, interest and critical mass from embryology and developmental biology. As Keller (1995: 18) puts it :

‘Watson and Crick have gotten a lot of credit for their work and deservedly so, but one contribution has, I fear, been overlooked: their introduction of the information metaphor to the repertoire of biological discourse was a stroke of genius.’

Keller also criticises metaphors such as ‘message’ arguing that their role in the discourse of contemporary life sciences is to define the paths along which research can proceed.

Even though the use of terms such as ‘code’, ‘information’ and ‘programme’ are commonly associated with Watson and Crick, the use of such metaphors was not a novelty in 1953 (Dijck 1998, Kay 1995). ‘Legibility of nature’ and ‘the book of nature’ were common tropes in life sciences, and the term code had already been coined before the end of the Second World War. The physicist Erwin Schrödinger (1887-1961), whose famous book *What is Life?* is often referred to by scientists as a source of inspiration (Watson 1969), is said to have evoked the notion of programme to describe the principles of heredity in 1944. The term would only be employed in this context by the biologists Jacques Monod (1910-1976) and François Jacob (1920-2013) in 1961 (Keller 2000). During the 1960s, the code metaphor was so often used that the biochemist Erwin Chargaff (1905-2002) dubbed it ‘grammar of biology’ (Dijck 1998: 36). The acceptance of the code metaphor might also have been pushed by other theories that became popular during the sixties. In that decade, the linguist Noam Chomsky was revolutionizing linguistics with the notion of a transformative generative grammar; while Marshall McLuhan (1911-1980) was spreading the appealing idea that the medium is the message.

Morange (2001) considers that talking about genes as books or codes can be misleading. In that way, genes appear above other components of the cell, as if the nucleus was more important than the whole cellular machinery. If molecular biologists had to designate one category of molecules as essential to life, notes Morange, it would be proteins rather than DNA and genes. It does not alter, nevertheless, the appealing power of genetics: genes can be modified. Proteins can be adapted as well, but this manipulation does not imply the transmission of new information to subsequent generations. As a result, the emphasis on genetics might have encouraged the idea that the answers to the as yet unanswered questions of life lie in the genes.

Critics regard the idea of genes as powerful entities as a dangerous one. They believe that this notion can influence popular perceptions of the possibilities, costs and limits of genetic and genomic research. Nelkin and Lindee (1995), for instance, coined the expression ‘genetic essentialism’ precisely to raise awareness to those risks. The ‘genetic essentialism’ is presented as a phenomenon that ‘reduces the self to

a molecular entity, equating human beings, in all their social, historical, and moral complexity with their genes' (Nelkin & Lindee 1995: 2).

The use of genetic metaphors and images, whether to promote expensive science research or to communicate new concepts to lay audiences, has aroused an intense debate among different groups including scientists, social sciences scholars, philosophers and historians of science. The critics' main concern seems to be that misrepresentations of DNA spread in popular culture and public discourse, reinforcing a gene-centred perception of humans. It has been stressed that those figurations can lead us to genetic determinism, but few critics offer alternatives. The bread or cake recipe is one of the rare suggested alternative metaphors. Authors like Rothman (1998) argue that the recipe approach is a better way of understanding DNA than blueprints, plans and information metaphors. This is because baking is a process in which growth and development are important aspects. As Rothman (1998: 23) puts it:

'A recipe might make more sense as an analogy. Take bread baking, which combines making something with growth, the growth of the yeast that gives bread its rise. The same recipe under different circumstances gives you different breads.'

Despite the worries about misleading messages circulating amongst the public, a growing body of research argues that lay audiences are very efficient in transforming information emerging from genetic science and technology into knowledge meaningful to them (Barns et al. 2000, Cunningham-Burley & Kerr 1999, Davison et al. 1997, Parsons & Atkinson 1992). Lay audiences are constantly bringing their individual frames of reference to bear on their understanding of science (Wynne 1992). But because science is a 'politically potent discursive tool', this fact can be overlooked (Michael 1992: 331). Cunningham-Burley and Kerr (1999) note that although there are examples of an alleged 'deficit' in the publics' understanding of genetics in the social scientific literature, much of the research in this area 'takes lay perspectives seriously'. Science communication studies have discredited the top-down models of public communication popular in the 1980s, including the 'deficit model' underlying the Public Understanding of Science movement in United Kingdom (Bell *et al.* 2008, Gregory & Miller 1998).

The idea that genetic issues have been wrongly conveyed to a lay audience

implies two subliminal messages. First, that the audience is a passive group which would absorb discourses in a sponge-like and uncritical manner. Condit (1999a, 1999b, 2001) disagrees with the notion that mass media portrayals reinforce discriminatory or deterministic attitudes. An audience study has produced evidence that this idea is ‘misrepresentative’ (Condit 1999b: 171), devalues audiences as active readers and ignores their ability to engender their own interpretations and counter-interpretations. Condit’s conclusion suggests that it is not correct to view audience as passive receptors, nor is acceptable to consider science communication agents as those responsible for disseminating deterministic assumptions about genetics.

In public discourse, genes have several meanings (Condit 1999a). As such, any attempt to translate them into one single definition would be simplistic. Meanings are commonly created or pushed forward by popular images (Dijck 1998, Turney 1998). And popular images and imaginations are, in their turn, ‘equally generated by scientists, public relation managers, journalists and *fiction writers*’ (Dijck 1998: 17, emphasis mine). This shows that the production of meaning involves several interest groups that interact in an interdependent and dynamic manner. Acknowledging that these discourses overlap and are interconnected in the wide cultural arena, and recognizing the active role popular views and values play inside it, seems to be the appropriate route to understand the contingent and variable interactions between science and society. My aim in this thesis is to pay attention to one such discourse, that generated by literary novelists.

### **Novels as vehicles of science communication**

Fiction is grounded in the act of imagining – it is not only an expression of the author’s imagination but also a cultural product that involves an imaginative response. Narrative imagining can be considered the basic tool of thought (Turner 1996). This means that stories are at the heart of communication processes and, therefore, the notion that fiction has an important role to play in science communication should provoke no surprise (Turney 2009). As a *Science Communication* editor rightly argues, fiction ‘promises to reach audiences not often captivated by nonfiction and should not be dismissed by serious science communicators’ (Valenti 2007).

Attempts have been made to show that communicating science in fiction is a

good model of diffusion and discussion of scientific knowledge. The phrase ‘science in fiction’ was advanced in the 1980s by Carl Djerassi, the man who studied the synthesis of progesterone and paved the way for the contraceptive pill. Djerassi began writing science in fiction aiming to portray ‘the tribal culture of contemporary science’ (Russell 2010: 312). The success of his first book, *Cantor’s Dilemma*, led him to continue writing fiction with the aim to instruct readers while entertaining them.

Inspired by the work of Djerassi, the cell biologist and novelist Jennifer Rohn coined in 2001 the term ‘lab lit’ to describe novels in which scientists are represented as central characters and in a realistic manner (Bouton 2012, Rohn 2008). In 2005, Rohn and collaborators created the website LabLit.com, an online forum dedicated to representations and perceptions of laboratory culture in fiction and across popular culture. Other United Kingdom organizations – SciTalk, Manchester Beacon for Public Engagement or Public Awareness of Science and Engineering (PAWS) – encourage writers and scientists to work together. In 2011, for example, Ra Page edited a book of short stories in which authors worked in close collaboration with appointed scientific consultants. The objective was to depict scientists not as heroes or villains but as ‘complex, beleaguered, unexaggerated, and imperfect human beings’ (Page 2011: xii). Recently, the novelist Susan M. Gaines launched Fiction Meets Science, a project founded with the purpose of promoting the encounter of novelists with literary scholars, sociologists, and scientists.<sup>3</sup> The objective is to analyse and increase the ‘small body’ of contemporary Anglophone and German novels that tell stories about scientists and their discoveries.

Even though instructing readers about scientific facts may be a noble objective, it is important to remember that most novels are meant to entertain readers. As Gaines (2001) observes, ‘[t]he literary novel is, by its nature, non-didactic; nor a lesson in science, nor one in morality, it can only be an elucidation of either, or of both’. Mellor and colleagues also note that ‘much science communication is in fact consumed for its *entertainment* value’ (Mellor *et al.* 2008: 7). To combine entertainment and instruction, as Djerassi aims, may be a desirable goal but a difficult one to achieve. It remains a challenge to embed chunks of scientific facts in a novel while keeping it an appealing and entertaining cultural product. As Turney (2009:

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<sup>3</sup> See <http://fictionmeetsscience.org>.



168) puts it: '[i]ncorporating large amounts of science in a work of fiction is liable to violate the contract with the reader, who is seeking a story, not an instruction'. The difficulty lies in successfully handling the tension between storytelling and the exposition of science facts (Russell 2010).

Despite these problems, in recent years, a growing number of British novels have included science and scientists in their narratives (Rohn 2010). Not all of them depict scientists as central characters but I do not see this necessarily as a flaw. Not all of them lecture readers on scientific facts. In fact, it is possible to touch on scientific topics without having scientists as main characters – and most of the novels here analysed are an example of this. If we try to locate where the preoccupation with the representation of scientists comes from, we will see that this concern often emerges from science professionals. It is natural for scientists to worry about their own representation in cultural products. And it seems only fair that they are portrayed in a realistic manner, and not in the negative light in which they have often been depicted (Haynes 1994, Nelkin 1987, Weart 1988). But this does not mean that science communication, as a relatively young discipline, has to make an effort to turn literary novels into science-friendly products. Science in fiction does not have to be about portraying scientists as main characters or promoting scientific literacy. Science in fiction can be – and should be – also about scientific methods, the business of doing science and, more importantly to the present study, about the implications of new scientific knowledge or products for human beings and their understanding of the human condition.

I see novels as an arena for questioning human affairs and the world they live in – and this obviously means questioning science and scientists too. Being questioned can be uncomfortable. But if science communication scholars want to continue breaking the traditional divide between scientific experts and others, if they really want to undermine notions of an ignorant public in need of scientific lessons, then literary novels cannot be assessed only on the grounds of how positively they represent scientists or how big are the chunks of scientific knowledge they convey. Literary novels are not supposed to be textbooks. Fictional texts should not be written in this way or another just because science, engineering, and technology careers need to attract more students. Novelists have artistic freedom and they are not obliged to be docile. The first concern should always be literary and not didactic.

Literary novels afford the opportunity to explore contemporary science as a

socially-embedded enterprise. Therefore, they constitute a possible object of study in science communication. Researchers have been paying attention to fictional narratives in audiovisual forms (Barriga *et al.* 2010, Bates 2005, Jackson 2011, Jensen 2008, Jörg 2003, Kirby 2000, 2003, LaFolette 2002, Long *et al.* 2010, Steinke 2005, Tranter & Statham 2007). Some effort has also been devoted to speculative and science fiction books (Delgado *et al.* 2012, Thurs 2007). Little attention has been paid to literary novels as media products containing scientific information – although there are, of course, exceptions (Brier 2006, Cassar 2005, Haynes 1994, Russell 2007, 2009, 2010, Sleigh 2008, 2011). This means we have been overlooking a mass product that, along with other novelistic genres, reaches a considerable audience: during the first eight weeks of 2012, for example, Britons bought 7.6 million novels (Hall 2012). Recent figures have been decreasing because they do not take into account the popularity of e-books, where novels are also downloaded and read. As Rohn (2010) notes, electronic reading devices should be seen as an opportunity in the development of science in fiction:

‘The rise of electronic publishing and online communities may further fuel the growth in lab-lit fiction by bringing the genre to the attention of more readers and allowing potential writers to bypass traditional publishers.’

Fiction is one of the many cultural arenas where science is negotiated (Dijck 1998). From the laboratory to science fiction, Dijck sees the meanings of genetics and genomics plotted and explored in multilayered and different spaces. Following a dominant attitude amongst science studies scholars, Dijck mentions ‘science fiction’ rather than ‘fiction’. In fact, there are many genres of fiction that help to shape scientific and technological knowledge for a general audience – science fiction is just one of them. Precisely because science is plotted and explored in multilayered and different spaces, I argue that we should pay attention to a greater variety of genres and texts. Only by broadening the range of media products analysed will we be able to have a better understanding of the ways in which scientific messages are processed in public sphere.

Like Dijck, other scholars put great emphasis on considering a variety of cultural products about science but forget to mention novels as one of them. Matthew

C. Nisbet, for example, rightly argues that ‘scientific organizations need to track science-related media coverage (news, entertainment) to be aware of the cultural contexts through which the public interprets science’ (Nisbet in Semir 2010: 58). Nisbet considers talk radio, blockbusters films, entertainment TV, late night comedy and national newscasts. He stresses that these media forms can provide broader audiences with alternative messages about science topics and therefore may be important outlets for science communication. While I agree with Nisbet, I find it problematic that novels are seldom mentioned as a vehicle of science communication.

In this thesis, I argue that more scholarly attention should be paid to literary novels as vehicles of science communication. They are a privileged genre to convey different forms of knowledge. First, novels are a flexible literary form. It is possible to embed within a novel, for instance, a map of patterns of genetic inheritance in Europe, as happens in Carole Cadwalladr’s *The Family Tree*. Secondly, novels tend to explore the complex psychological and emotional relationship of human beings with the world. Scientific content is more accessible if framed with human interest, and reaches a broader audience in new ways that allow readers to engage in the psychosocial dynamics of the character. Thirdly, fictional accounts explore grey areas. This means that they easily accommodate ideas of doubt and ambiguity. Considering that communicating uncertainty is a key challenge in the business of science communication – uncertainty has been traditionally abhorred by science reporters, for instance (Henderson & Kitzinger 1999: 575) – literary novels constitute a privileged medium to address scientific problems. Fourthly, in novels it is possible to find pieces of scientific knowledge which have been selected and transformed by novelists. Because their primary objective is not to didactically explain scientific concepts to the public, novelists are well positioned to integrate this information in their own frame of reference, one that readers may effortlessly relate to. After all, these novelists are members of the public discussing genetics in their own language.

When we consider a novel, we cannot only think about a book as an object and the intangible narrative it contains. As with any other media product, a novel has a social role that takes place in a specific context. A novel – if read – implies a practical relationship with readers but also with social actors in economic, social and cultural contexts. But a novel is also, when considered as the outcome of a production process, a cultural product created in a certain historical time and in certain contexts that are themselves related to other contexts and people. Such a network of relations is

somehow projected onto the page and may bring with it representations about science, its uses and abuses, its future and its role in society.

I will end this introduction with a description of each of the chapters, followed by a succinct overview of my general argument.

### **Chapter one: Novel summaries**

This chapter provides summaries of the six novels which form the corpus: Margaret Drabble's *The Peppered Moth*, Maggie Gee's *The Ice People*, Simon Mawer's *Mendel's Dwarf*, A.S. Byatt's *A Whistling Woman*, Carole Cadwalladr's *The Family Tree* and David Mitchell's *Cloud Atlas*. While reviewing their plots, I pay particular attention to the narrative threads about genetics.

### **Chapter two: Popular science authors**

Key ideas of the most prominent popular science authors who write about genetics and human nature – Edward O. Wilson, Richard Dawkins, Steven Pinker and Steve Jones – are summarized in this chapter. These science writers expound pervasive scientific accounts of human nature. An overview of their narratives is important because they have caught the attention of fiction writers, who have responded to them in their novels.

### **Chapter three: Methodology**

This outlines my methods and approach to analysis. It also describes the interviewing, sampling, transcribing and coding strategies adopted.

### **Chapter four: Margaret Drabble's *The Peppered Moth***

This first analytical chapter argues that Margaret Drabble has changed her view of human nature over the last decades and that this shift has implications on her fictional production. I analyse the two leading scientific metaphors in the novel – the mitochondrial DNA and the peppered moth – and show that Drabble borrows ideas and concepts from biology in order to develop her own fictional agenda.

### **Chapter five: Maggie Gee's *The Ice People***

Here I argue that Maggie Gee's understanding of human nature is largely anchored in biology. In analysing her novel *The Ice People*, I show that the view of humans she represents is one of individuals divided between their evolved brains and their animal nature. Infertility is the price humans pay for their inability to reconcile both sides. The vision of humanity is a pessimistic one: humans are haunted by their cultural and technological evolution.

#### **Chapter six: Simon Mawer's *Mendel's Dwarf***

My analysis of *Mendel's Dwarf* shows how the notion of continuous scientific progress is challenged in the novel. The limits of science in controlling and predicting the human body are exposed in the narrative. I also demonstrate that Mawer believes that the raw stuff of humanity will never be fully explained by science and its contemporary reductionist approach.

#### **Chapter seven: A.S. Byatt's *A Whistling Woman***

My chief argument in this chapter is that Byatt gestures towards the notion that human behaviour is biologically built-in. I argue that what Byatt does in *A Whistling Woman* is to explore the implications of this belief while testing them in her own characters. I demonstrate this by analysing excerpts of the novel and exploring examples of characters' behaviour placed on a scientific basis.

#### **Chapter eight: Carole Cadwalladr's *The Family Tree***

I argue in this chapter that evolutionary psychology books helped Carole Cadwalladr to shape *The Family Tree*, or at least the way the human nature debate is framed in it. My discussion of the novel demonstrates how the novelist drew on Steven Pinker to create a character. I also show the ways in which Cadwalladr simultaneously acknowledges and challenges Pinker's scientific authority.

#### **Chapter nine: David Mitchell's *Cloud Atlas***

This chapter argues that, in *Cloud Atlas*, violence and tyranny are presented as part of human nature. This disenchanted view of humanity also depicts genetic engineering as an ultimate form of exploitation of individuals in a futuristic society. In the particular narrative analysed, human lives are predetermined and genetically manipulated.

The literary novels considered in this thesis demonstrate a tension between conflicting views of human nature. These anxieties are not easy to solve, and they express a degree of pessimism about the human condition. We find in these fictional narratives characters questioning the origins of their own decisions and feelings. They ponder whether their behaviour is socially given or culturally constructed. They doubt their agency. This inquiry is often left unresolved. My explorations of these narratives show how literary novels constitute a privileged medium not only to convey complex ideas – uncertainty, for instance – but also to present them within a human interest framing.

Novelists considered in this study regard science as an important component of contemporary experience. Scientific ideas and concepts are part of the world they inhabit; therefore these elements are naturally brought into their narratives. In many ways, these contemporary authors render obsolete the iconic *Two Cultures* lecture (Snow 1998). The novelist and physicist C. P. Snow (1905-1980) claimed that professionals of science and literature were ignorant of one another's field (see Ortolano 2011).<sup>4</sup> In this respect, Snow's assumption could not be more outdated.

My interviews suggest that novelists are both producers and consumers of cultural products containing scientific information. They critically process such data, adapting, contesting or reframing them in the stories they are able to tell. They do so partly because they find in scientific knowledge explanatory elements that serve their literary needs. Above all, this research shows that novelists are able to incorporate ideas about genetics in their narratives without simply perpetuating a reductionist discourse.

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<sup>4</sup> I do not explore further in this thesis C. P. Snow's 1959 famous lecture on the 'two cultures'. I agree with Sleight (2011: 3) when she writes that it is not only 'an obligatory but uninspiring inclusion in any introduction to the field of literature and science', but also of questionable relevance today.

## Chapter one

### Novel summaries

This chapter provides summaries of the six novels from the corpus: Margaret Drabble's *The Peppered Moth*, Maggie Gee's *The Ice People*, Simon Mawer's *Mendel's Dwarf*, A.S. Byatt's *A Whistling Woman*, Carole Cadwalladr's *The Family Tree* and David Mitchell's *Cloud Atlas*. The novels summarized below appear in the same order in which they are analysed in the following chapters of this thesis. While reviewing their plots, I pay particular attention to the narrative threads about genetics.

In the preface to the second edition of *Darwin's Plots*, Gillian Beer muses on the recent advances in science and on the fictional responses they entail: '[w]hat new tales are being unleashed from scientific work now? And what new forms of storytelling?' (2009: xxviii). If in the 1980s novels reflected the 'cultural preoccupation with physical theories of the universe', since the 1990s British novelists 'show a marked orientation towards and engagement with the biological sciences' (Waugh 2005: 63). The novels from the corpus are examples of the ways in which contemporary authors incorporated genetics in their narratives.

Which stories about genetics are these authors able to tell? There are novels exploring the notions of inheritance and biological fate. Both Margaret Drabble's *The Peppered Moth* and Carole Cadwalladr's *The Family Tree* chart the lives of three generations of a British family. They draw on scientific knowledge – the mitochondrial DNA or the genetic basis for mental illnesses, for instance – to explore mothers' and daughters' relationship. Drabble and Cadwalladr (among other novelists from the corpus) borrow ideas from gene-centred disciplines in order to meaningfully articulate them with their own fictional agendas.

There are also novels interested in the social implications of biotechnological possibilities in the future. In *The Ice People*, Maggie Gee envisages a society where infertility, gender segregation and climate change are the price to pay for cultural and scientific evolution. In a world where the few existent babies are designed in

laboratories, the main character desperately seeks for his son, ‘stopping at nothing to save his genes’ (208). In *Cloud Atlas*, David Mitchell presents us with Nea So Copros, a place where clones are genetically engineered for slave labour. It is, as Turney defines it, a novel ‘in which biotech is just a taken for granted feature of the landscape’ – and also in which there is only a remote concern with ‘conveying facts about science’ (2009: 170).

The pressing problems of DNA technologies are also explored in Simon Mawer’s *Mendel’s Dwarf* – but, unlike *The Ice People* and *Cloud Atlas*, this novel takes place in the present and deals with existing scientific knowledge and techniques. Mawer portrays a dwarf geneticist who discovers the gene associated with achondroplasia and, consequently, an easy method of prenatal screening for embryos affected by his own condition. In contrast with the other novels mentioned above, Mawer focuses deeply on the scientific enterprise. He does so by telling the story from the point of view of someone who is simultaneously subject and object of scientific inquiry. In so doing, Mawer offers readers ‘literary explorations of scientific culture, featuring characters whose lives are informed by direct involvement with scientific knowledge’ (Gaines 2001). This is what Gaines calls ‘serious treatments of science in fiction’ (2001). Even though using a different style and focalization, A.S. Byatt is as engaged as Mawer in approaching the language and the culture of science in *A Whistling Woman*. In this novel, among a profusion of characters and plots, we find a group of scientists seriously discussing whether human morals and ethics can be placed on a scientific basis.

It is true that not all literary novels from the corpus are concerned with conveying scientific facts. Nor do they all feature characters directly involved with scientific knowledge. I argue, nevertheless, that they all should be considered ‘serious’ treatments of science in fiction. As I mentioned earlier, science in fiction does not have to be inevitably about portraying scientists as main characters or promoting scientific literacy. Science covers much more than scientific facts or knowledge. It is part of our culture and constitutes a mode of understanding ourselves. If we consider that humans are influenced by the social context in which they exist, and that science plays an important role in that very social context, any representation or interrogation of human nature will be incomplete ignoring science. Therefore science in fiction should also be about the implications of scientific knowledge or products for human beings. In fact, literary novels constitute a



privileged space for these purposes. Because this genre deals complexly and imaginatively with human experience, it accommodates literary explorations of science *within* fictional social contexts that readers can relate to. In the end, this is what all the novels summarized below have in common: they all articulate, with varying degrees of sophistication, human experience with real-life implications of scientific ideas.

### **Margaret Drabble's *The Peppered Moth***

*The Peppered Moth* is a novel about mothers and daughters, and also about how their relationship can be tainted by the anxiety of genetic influence. The book spans four generations of women up to the present. The narration begins with a contemporary scientific meeting on molecular genetics and matrilineal lineage but soon goes back in time, depicting the Bawtry family in the early 1900s in Breaseborough, a coal mining town in southern Yorkshire. It is this flashback that introduces the reader to Bessie Bawtry, a character developed under the light of the evolutionary metaphor evoked in the title of the novel.

Bessie is a beautiful and extraordinarily intelligent girl from a working-class background (her father is an electrician). She deeply thinks she deserves better and, therefore, distances herself from the dirty universe of coal miners. In fact, she manages to win a scholarship to study at Cambridge. As the plot progresses, everything makes the reader feel that a butterfly is about to burst out of a cocoon. However, against all odds, Bessie's poor health and obsessive behaviour drive her back to her hometown. She ends up marrying the good-hearted barrister Joe Barron, has two babies (Robert and Chrissie) and spends the rest of her life mourning over her fate. Bessie is presented by Drabble as an anti-heroine: the bright girl who ends up locked in a kitchen among nappies and saucepans.

To build such a character, Margaret Drabble drew inspiration from her mother, Kathleen Marie Bloor, who died in April 1984 and to whom the book is dedicated. The way Drabble's mother is fictionally depicted as Bessie Bawtry suggests that Bessie's children have little motivation to welcome their inheritance. Bessie is described as a depressed person with an aggressive temperament. In short, 'an unlovable woman' (Mackenzie 2000). This is the way Margaret Drabble remembers

her mother: '[s]he was highly intelligent, angry, deeply disappointed and manipulative woman' (390). But A.S. Byatt – Drabble's oldest sister – rejects this portrait of her mother (Merkin 2001). As Drabble herself points out in the afterword of *The Peppered Moth*, '[e]ach child has a different mother' (391).

I mentioned that *The Peppered Moth* was a novel about mothers and daughters. In the narrative, Bessie is the daughter of Ellen Cudworth. Bessie is also the mother of Chrissie and the grandmother of Faro. Readers have privileged access to both Chrissie's and Faro's minds; much less attention is paid to Ellen Cudworth's psychology as a character. Unlike her mother, Chrissie pursues a happy existence and tries as hard as she can to avoid what the narrator calls 'fate'. The way she does it is by adopting a bold behaviour in order to cope with the anxiety of the genetic influence: 'If she went out with boys like this, she could surely never turn into her mother? Turning into her mother was (and was long to remain) Chrissie's darkest fear' (186-7). Chrissie's behaviour expresses her desire to cut herself off from the past and re-invent herself free of any genealogical burden.

The fear about the repetition of the past is also discussed in the novel when Chrissie's daughter, Faro, maintains an unhealthy relationship with Sebastian. Chrissie disapproves of their engagement precisely because there is something about it that mirrors her own relationship with Faro's father, Nick Gaulden, who drank until death. When Faro and Sebastian break up, Chrissie vividly encourages her daughter to pursue her affair with Steve, also recommending a serious engagement followed by a convenient pregnancy: '[i]t is time she found somebody young, healthy and happy, with whom she can *perpetuate* Bessie and Chrissie's *long-lived unbroken mitochondrial DNA*' (360-1, emphasis mine). For the mitochondrial DNA (mtDNA) is almost exclusively transmissible through matrilineal lineage, Chrissie fears that this feminine legacy will get lost if Faro does not have a baby.

We can thus identify two leading scientific metaphors in the novel: one is the peppered moth standing for Bessie's inability to adapt to new environments; the other is the mtDNA serving as a literary device to explore the relationship between mothers and daughters. The novel begins by focusing on molecular genetics rather than Darwinian natural selection. The narrator describes the arrangements in the hall of a Methodist Church for a lecture by the microbiologist Dr. Robert Hawthorn to the people of Breaseborough. Given that Dr. Hawthorn is a specialist in the subject of mitochondrial DNA and matrilineal descent, his presentation constitutes a narrative

solution to inform readers about the scientific ideas used in the plot. As to the peppered moth and its natural history, it will only be mentioned three-quarters of the way through the novel.

As explored in *The Peppered Moth*, the metaphor suggests that Bessie (and consequently Drabble's mother) was unhappy and unlovable because she felt displaced. Her delicate complexion and intelligence did not match with her dirty and impoverished hometown. But once in Cambridge, she could not adapt to such a sophisticated environment either. She could not help it. This comparison is not scientifically accurate but the classic example of natural selection serves as a fictional frame to investigate human nature, or at least to try to justify it.

In Faro's account of the peppered moth story, she denies genetic determinism as an unavoidable fate: '[h]ow could one, asked Faro, believe that everything was genetically or environmentally determined, and at the same time that all mutation was random?' (146). Faro Gaulden is a science journalist described as a young woman 'interested in the past' (132) and in issues about geographical migrations. She read History of Science at the University of Waterford and 'was also supposed to be writing a popular book on changing concepts of evolutionary determinism' (145). As someone against genetic determinism, one might imagine that Faro would not be overwhelmed by the idea of essential molecules connecting her to a distant human past. But Faro is fascinated by tracing back her origins, for she 'too had been newly infected by a curiosity about her homeland' (161).

Before molecular genetics technologies, the Bawtries' family tree could hardly stretch back to more than a few centuries. Genealogy relied greatly on parish records, birth certificates and other local documents. But now genetics and genealogy are unveiling people's deeper ancestry. As a character of *The Peppered Moth* says, '[e]verybody seemed to be trying to trace origins. The origins of families and of species' (148). What Dr. Robert Hawthorn proposes is to collect DNA samples from local women and use a mtDNA test to find out which families in Breaseborough descend from Cotterhall Man.

The Cotterhall Man is a Stone Age skeleton accidentally found 'in a limestone cavern beneath the cliffs of Cotterhall' (69). Dr. Robert Hawthorn's project eventually establishes that Faro Gaulden, Bessie's granddaughter, is in fact genetically related to Cotterhall Man. This means Faro's 'genes had dwelled in Hammervale since the end of the Ice Age' (358). Faro is delighted to know that. The discovery even helps her to

make a serious decision about her emotional life: she will break away from Sebastian, her destructive boyfriend. The ‘momentous discovery’ also seems to give Faro’s life a new meaning (359). She gets engaged to Steven, precisely the man who accidentally discovered the hollow chamber with the Stone Age skeleton resting in it. Contradicting her mother’s behaviour, Faro is not keen to escape the North for the South – rather, she abandons her life in London and moves North to seek a possibility of reinventing herself. It remains unclear whether or not genes determine the course of women’s lives in the Cudwoths lineage.

### **Maggie Gee’s *The Ice People***

*The Ice People* is a novel set in a future world devastated by climate change. It is a story about the relationship between men and women but also a reflection on humans’ relationship with technology. It is narrated by a man (Saul) witnessing the failure of civilization as we know it: the character examines the journey of his life; in so doing, he depicts a species haunted by its own cultural and technological evolution. While revisiting his past, the narrator admits it was a mistake to blindly believe in human exceptionality (‘I was besotted with our cleverness’, 13). Human hubris is presented as the driving force that led to a dysfunctional, technologically oppressed society.

Gee explores the context of global disaster and environmental catastrophe as a plot device, a convenient option that allows the narrator to interrogate aspects of human significance and human control over nature. It is unclear which causes and politics of climate change are in the narrative – they seem to be less important than the relationship between men and women; humans and technology. Even though literary fiction is not obliged to anchor itself in scientific logic and physical laws, Gee tries to construct an apocalyptic future framed by scientific knowledge by quoting six science texts in the epigraph. There we can read an excerpt from Windsor Chorlton’s *The Ice Ages* (‘The great glaciers of the Ice Age will return’) or Adrian Berry’s *The Next Five Hundred Years* (‘Just two decades had been sufficient to transform a balmy climate into one as frigid as Lapland’).

In the 2050s, the planet is facing another ice age. Men and women no longer live together, but the characters Sarah and Saul are initially an exception to the rule – they fall in love, marry and have a baby. However, as the temperature decreases, their

marriage comes to an end. Sarah follows the man-hating common trend and joins an ultra-feminist activist group Wicca. She takes their son with her and refuses to let Saul see the child. Then Saul kidnaps his son and heads to Africa, with the last warm places on Earth. This rivalry between sexes is meaningful to our study as Gee regards reproduction as the main reason why men and women cohabit, thus placing human relations on a biological basis (Paton 1999).

In narrative terms, *The Ice People* consists of the written memories of Saul, a man 'over sixty' who tried to flee from the deepening cold in the Northern Hemisphere. The past is evoked in the narrative in elliptical flashbacks and in an epic style: 'I, Saul, Teller of Tales, Keeper of Doves, Slayer of Wolves, shall tell the story of my times' (3). Fearing an imminent death, Saul recalls his happy early life and describes his journey until he had eventually ended up at an abandoned airport. The place of former constant arrivals and departures is now human dead-end dominated by gangs of wild boys and their old electronic pets. The youngsters not only do not respect the few elderly existing survivors, but also seem to lack skills and virtues common in the former generation's children. They have little command of language and behave aggressively. Conversely, Saul appears to represent the last civilized man on Earth.

After nine years of cohabitation, Sarah begins to take part in a feminist movement called 'The Children's Commune', in which the few male adolescents are fed female hormones. The more Sarah gets acquainted with this group, which later becomes a powerful political party, the more the relationship with Saul is weakened. In fact, since Saul spends too much time working in the office, and it takes him a long time to realize this shift in their relationship. He works as a nanotechnologist on an artificial intelligence research project. In his epic-style narration, Saul gives an account of his own inability to cope with the separatist agenda for women.

The misunderstanding between sexes in *The Ice People* can be partly explained by the increasing difficulties with conception. As Maggie Gee pointed out in an interview published in *The Guardian*: 'If there were real fertility problems in the future, I can't see what would keep the sexes together. The point of sexual differentiation is procreation' (Paton 1999). In the novel, the few existent couples are often infertile, depending thus on reproductive technologies ('techfix conception', 32) to overcome their childless condition. Sarah and Saul were no exception to this: Saul's 'sperm was semifertile' and they, too, relied on Dr. Zeuss's fertility clinic to produce

Luke (33). As the relationship between men and women reaches a point of no return, child-like robots become quite popular among males, possibly due to the fact that they cannot conceive ('They were the children of our brains, not our bodies', 238).

*The Ice People* can also be described as the story of a father desperately seeking his son. The importance of biology in the relationship between father and son is emphasized in the novel. The narrator wonders what prompts parents to unconditionally protect their offspring and admits that his long journey may have been motivated, after all, by kinship selection: 'But now, when I am so much older and colder, I see I wasn't a hero, or a villain, or any of these things they say in stories – but merely one tiny unit of biology, stopping at nothing to save his genes' (208). By the end of the narrative, Saul shows he is prepared to die after a long journey: 'I'm not afraid. I've had my day. Our Days are gone; burning, frozen. . . . Or maybe I outlived my use when I lost my son . . . We live in Luke, we can never be parted' (241-2). Believing he will survive through his son, who bears his genetic legacy, Saul finally feels ready to be sacrificed.

### **Simon Mawer's *Mendel's Dwarf***

As the title of the novel *Mendel's Dwarf* suggests, the main character – Benedict Lambert – is a dwarf who happens to be the great-great-great-nephew of Gregor Mendel, the friar<sup>5</sup> who unveiled the principles of inheritance. Benedict Lambert is a geneticist who wants to understand the molecular workings of his own genetic problem, achondroplasia. Characterized by short-limbed dwarfism and macrocephaly, the condition is the most common cause of dwarfism in man, affecting one in 15000 live births (Merrer et al. 1994). Throughout the novel, the main character ponders how much of human life is determined by chance: in the case of achondroplasia, it takes a single point mutation to dramatically alter the physical aspect of an individual.

Woven through the novel is the tale of Gregor Mendel himself. It includes

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<sup>5</sup> Mawer argues that Gregor Mendel was indeed a friar – and not a monk. In *Gregor Mendel: Planting the Seeds of Genetics*, a non-fiction book about Mendel's life and legacy, he writes: 'Mendel, the Father of Genetics. Peas; they know he worked with peas. And they know he was a monk (wrong, but it'll do for the moment)' (Mawer 2006: 7). Monks live in retirement and solitude while friars live amongst the people, as Mendel did.

imagined scenes of the friar with his family, in his beloved pea garden, and carrying on a (fictional and platonic) flirtation with a local lady called Adelaide Rotwang. The narrative comprises, therefore, two entwined threads – Mendel's and Benedict's. In these parallel cases, Mawer explores the ways in which the chance of the genetic draw may become a matter of choice. Benedict Lambert not only discovers the gene where the achondroplasia mutation lies, but also uses this knowledge to select the embryo that will develop into his child. In that sense, a biological fate caused by chance (achondroplasia) is turned by science into something avoidable (preimplantation genetic diagnosis). In addition to these two threads, there is third one dedicated to the history of eugenics. Scientists and contributors to the discipline of genetics are named, and historically contextualized, in the body of the novel. These three narrative lines naturally touch or overlap each other throughout the 23 chapters of the novel.

During his adolescence, Benedict is constantly reminded of how 'different' he is. This contributed to his decision to turn the public library into a shelter – it 'was a refuge, you see, a place of quiet, a place of sympathy' (30). He is particularly fond of one of the assistant librarians, Miss Jean Piercey (I suppose the pun was intended), who used to talk to Ben 'almost as though' he was 'normal' (31). Benedict will re-encounter Jean years later, when he takes a research position in a London university where she works as a librarian. Jean is then unhappily married to Hugo Miller, an aggressive man who believes people like Benedict should not be allowed to have children. Jean develops a very close friendship with Benedict. He becomes her best friend, someone to rely upon as her marriage grows unstable and violent through time.

In a moment of crisis, Jean finds a shelter in Benedict's place. They drink together and end up having sexual intercourse. This episode will create a moment of tension that, once more, involves biology: an unexpected pregnancy poses questions of morality, biological inheritance and also patterns of normality. Jean opts to terminate the pregnancy due to the risk of delivering a baby with achondroplasia. Shortly after, she implores Benedict to help her getting pregnant again, but this time using *in vitro* fertilization, having thus reproductive choice and genetic control. Since her husband is infertile, Jean convinces Benedict to use his own sperm to fertilize her eggs and to select a 'normal' embryo to be implanted in her womb. But when the child is born, Hugo Miller realises that he cannot be his son: Adam has brown eyes, whereas both Hugo's and Jean's are blue. After discovering he was not only cuckolded but also 'cytologically cuckolded' (288), Hugo heads back to the maternity

ward and kills the baby boy. Jean is unable to defend her baby as she slipped unexpectedly into a coma after labour.

The novel also tries to show a lesser-known side of Gregor Mendel. “What I wanted was to look at Mendel through the eyes of today”, explains Mawer (SM, 302). Given that Mawer taught biology for years, he was especially interested in deconstructing one misconception that often appears in textbooks: the notion that Mendel was a monk calmly living in isolation in a monastery. Mawer himself had an idea of Mendel living in the country, miles from anywhere, “in a supra-material world” (SM, 310). What Mawer discovered when he visited Brno is that the monastery was in the middle of the city, beside the main square, where trams and people were a major part of the scenario. It seems, in fact, that Mendel “was all the time interacting with people; he was not isolated at all” (SM, 313-4).

Mawer is interested in portraying Mendel’s daily life and legacy as much as he engages with the backstage of contemporary science. Using humour and irony in his narrative, the author depicts the academic environment and how scientific knowledge is produced and validated. Its systems of funding and strategies of communication are also mentioned by the main character with a hint of sarcasm. There is, for instance, a tongue-in-cheek reference to popular science authors such as Steve Jones and Richard Dawkins: two of Benedict’s classmates back in school are named Dawkins and Jones. Mr Perkins, the biology teacher, tells both students off: ‘Stop talking, Dawkins. You never stop talking, boy, and you never have anything worth saying’ (26), says the teacher, who afterwards suggests Jones pay attention and stop spending all his time ‘fiddling’ (26).

Palmer (1998: 308) notes in her *Journal of Genetic Counselling* review that ‘Mawer’s observations and tongue-in-cheek play with genetics history and terminology will be appreciated by those in the genetics’ field as much as by ‘a wide audience’. Resta (1998: 199), in a book review in the *American Journal of Medical Genetics*, agrees: ‘Anyone involved with human genetics will want to read this book’. In fact, *Mendel’s Dwarf* is a novel that works at different levels of interpretation, offering the possibility of being enjoyed by different audiences despite differences in their scientific background.



## A.S. Byatt's *A Whistling Woman*

*A Whistling Woman* (2003) is part of a quartet that turns loosely around the character of the intelligent red-haired Frederica Potter, from her childhood to maturity. A.S. Byatt took more than two decades to complete the quartet: *The Virgin in the Garden* appeared in 1978, *Still Life* in 1985, and *Babel Tower* in 1996. *The Virgin in the Garden* depicts the Potter family life in 1953, in Britain, and *A Whistling Woman* concludes this non-traditional family saga in 1970. The sequels were released with several gap years in between, always having Frederica as a connection throughout the tetralogy. Our study will focus only on *A Whistling Woman* (2002), a novel that discusses science and genetics among several other themes.

The plot of *A Whistling Woman* has four strands and takes place in various settings. The spaces described in the narrative are a northern university, a hospital for the mentally ill, a religious commune, an anti-university campaigning group and, back in London, a TV studio where Frederica is the presenter of a programme called 'Through the Looking Glass'. All four strands – the academic, the counterculture, the religious cult and finally Frederica's one – are somehow interwoven, eventually converging to an interdisciplinary and controversial conference to be held in the University of North Yorkshire in 1969. They represent scientific, religious, social or cultural attempts to reconfigure the view of humans in the late sixties. In *A Whistling Woman*, the attempts that prevail are those endowed with reason and a fair-minded approach. By contrast, attempts endowed with fanaticism fail – the religious cult, for instance, ends in conflagration.

Sir Gerard Wijnobel runs the University of North Yorkshire. He is the scholar in charge of the academic meeting focused on the relations between body and mind. This conference gathers speakers who present different perspectives on human nature. Wijnobel, for instance, aims to inspire 'a biological-cognitive Theory of Everything' (26). The programme includes a debate on human cognition with Theobald Eichenbaum and the famous cognitive psycho-linguist Hodder Pinsky. Eichenbaum has dissimilar ideas from those of Pinsky in what concerns the learning process, but both agree on the point that human nature entails inborn structures and patterns of behaviour.

Having a suspicious past collaboration with the Nazis, Theobald Eichenbaum is prevented by counterculture activists and anti-university students from presenting

his keynote lecture at the meeting. At the end, the counterculture forces fade away and the university continues to be a meeting point for different kinds of knowledge. Groups endowed with reason thrive in *A Whistling Woman*, whereas movements which anchor their moral truths in fanatic faith or in unreasonable behaviour tend to meet unfortunate endings.

Yorkshire is also where Frederica's boyfriend, John Ottokar, will begin to work as a mathematician. The local university offers him a position to continue his project in advanced maths and he accepts the challenge of developing models for the geneticists Luk Lysgaard-Peacock and Jacqueline Winwar, the so-called group of 'snail scientists'. Peacock is interested in the classic genetic problem of altruism and sex, the same that occupied the minds of evolutionary biologists such as John Maynard Smith and W.D. Hamilton in the 1960s. Towards the end of the novel, Frederica and John Ottokar break up their relationship. Peacock becomes her lover and she gets pregnant. The literature-minded main character and the geneticist are then brought together in an ending that has been interpreted as an open path to a consilience of the cultures of humanities and sciences (Brown 2007).

John Ottokar has a mentally ill twin brother, called Paul but dubbed Zag, who gets involved with a pseudo-therapy group that eventually turns out to be a fanatic religious cult. The Quaker therapeutic community they have joined runs new bizarre purification rituals marshalled by Josh Lamb, a tormented visionary whose disturbance of consciousness is consistent with the medical description of epilepsy. During one such ritual, John and Paul-Zag Ottokar are asked to light whirling fire-lights that end up, accidentally, spreading to shrubs, clothes and premises. The ceremony ends in conflagration: three participants are dead (including Eva Wijn Nobel, the vice-chancellor's wife, who believed in astrology as a form of human self-knowledge) but the Ottokar twins survive. When John realizes his brother is in danger, he instinctively goes and saves him – an end consistent with the principles of kin selection theory, which are put forward by Peacock in the novel. But readers may also interpret this attitude as culturally derived: the twins were brought up together and developed an extremely close relationship, even devising their own private language – as twins not uncommonly do (Segal 2005).

Looking at the quartet as whole, it is clear that *A Whistling Woman* opens new possibilities to Frederica as a character. She quits her job as an English lecturer and finds herself profoundly curious about different forms of knowledge and

communication. She looks for a fresh start after a ‘hard-fought divorce’ (10) from Nigel. Frederica and her son, Leo, move into Agatha Mond’s house in Kennington (London). Even though the narrator acknowledges that they ‘were not exactly a family’ (10), it is clear that both women ‘supported each other in practical ways’ and that this resulted in ‘a kind of new and different domestic comfort’ (11). Byatt explains that the ‘arrangement of Agatha and Frederica is historical observation’, an attempt to convincingly represent in the novel what people were doing and thinking in the hectic late 1960s (ASB, 122). In her personal opinion, however, ‘nature is ignored at our peril’ in these non-nature groupings (ASB, 124-5). Frederica puts an end to the quartet carrying Luk’s baby in her womb, even though the inconclusive ending does not indicate whether they are going to live together as a family: ‘Frederica said to Leo “We haven’t the slightest idea what to do”’ (421).

*A Whistling Woman* is considered the ‘most polyvocal of all Byatt’s work’ (Campbell 2004: 247). The profusion of characters and focalisation are reminiscent of George Eliot’s literary style, allowing the reader – at least in theory – to have access to a great number of minds and discourses. The use of an omniscient narrator also contributes to the construction of multiple subjectivities, which is reinforced by tales and letters embedded in the main narrative stream. As such, compelling ideas emerging from different academic and cultural backgrounds in the late 1960s are explored within the narrative. In order to embed those ideas in the narrative, Byatt uses systems of performance and audience such as conferences. In this way, abstract concepts can be appropriately elaborated by some characters and later set against the background of other characters’ responses.

The novel aroused different responses among literary critics and readers. Its publishers claimed on the front flap of the hardcover edition that *A Whistling Woman* was an ‘intoxicating novel’ that ‘stands on its own’. As such, they were suggesting that readers would be able to appreciate its narrative even if they have not read the previous books of the tetralogy. But literary critics such as Ron Charles, the former *Christian Science Monitor*’s book editor, doubt it.<sup>6</sup> As he put it: ‘[t]he British publisher claims that *A Whistling Woman* stands on its own, but I just wished it would stand still.’ In his opinion, the novel is a ‘peripatetic story about the late 1960s’ that happens to be ‘as mesmerizing and confusing as that psychedelic era’ (Charles 2002).

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<sup>6</sup> The literary critic Ron Charles has been senior editor at *The Washington Post Book World* since 2005.

This reviewer also states that fans of A.S. Byatt's fiction can be separated into two groups: those who do not understand her novels and those who pretend they do.

Literary critics can be also divided in two groups. There are those who acknowledge Byatt's ability to intelligently manage words but think that prolixity and profusion of characters make her lose the plot 'under a mountain of bibliographic cavil' (Adams 2003). As a reviewer noted in *The Observer*, 'there are simply too many ideas' in *A Whistling Woman*, 'too many symbols, ideas and names compete for attention and comprehension' (MacFarlane 2002). The second group overtly applauds her 'novels of ideas', plenty of academic references, religious metaphors, Darwinian analogies and characters with hand-picked names.

### **Carole Cadwaladr's *The Family Tree***

*The Family Tree* (2005) is Carole Cadwalladr's first novel, the only published so far. The book charts the lives of three generations of a dysfunctional British family, the Monroes. Using a tragicomic narrative voice, the novel discusses several themes associated with genetics and inheritance. Examples of such themes are dubiously fathered children, the genetic basis 'for' mental illness, biological fate and eugenics. In many ways, *The Family Tree* can be described as a dialogue between two conflicting views of human nature – one anchored in biology and the other in culture.

The whole story is told from the point of view of Rebecca Monroe, who is researching for her dissertation on popular culture discourses of post-sexual-revolution in Britain. She believes that the human mind and behaviour are, to some extent, a product of the historical time people live in. Therefore, in her perspective, it is important to study discourses from TV programmes such as *Dallas* or *Charlie's Angels* because they helped to shape – as other popular culture artefacts did – the mindset of the generation who has grown up watching them.

Rebecca is married to Alistair Betterton, a scientist specialising in behavioural genetics. Rather than culture, he thinks that biology shapes the human condition. Our genes control our fate, Alistair insists, even though his wife is not so sure about the extraordinary and absolute power of molecular biology. The only sort of 'fate' Alistair believes in is 'genetic predisposition'. He also states that 'we're vehicles of our genes' and that 'our environment plays almost no role in how we turn out' (23). Those are the

messages he conveys both in interviews and in his book entitled 'Destiny's Child: Nature versus Nurture in the Age of Genome'. Alistair, it should be added, is described as a famous popular science author with regular appearances in the media.

In Rebecca's mind, science is not a sacred repository of the all answers for the world's mysteries. There is chance, for example. She accepts, up to a certain point, that we are the sum of our past, but also stresses that each one takes full responsibility for *most* of one's life – and 'most' is the correct word. Hence chance, Rebecca believes, plays a role in that game as well. Alistair disagrees: 'we're the sum of other people's pasts. We're made up of other people's genes. We're bits they leave behind' (9).

Rebecca has been married to Alistair for almost a decade, and this explains the fact that she effortlessly articulates two different views of human nature. Given Rebecca's educational background – humanities or social sciences, one infers – she describes Alistair's ideas from an interesting point of view: an outsider who has a privileged contact with inside information. This allows readers to have access to both sides of the debate – even though they are made aware of the fact that Rebecca's focalisation gives her, in theory, an advantaged position in showing her own arguments.

As a non-scientist interested in genetics, Rebecca is constantly putting academic jargon into simple language. Charts, graphics, maps and images are embedded in the novel. It is important to note that the character draws on genetic ideas to make sense of her life and problems. A good example of Rebecca's particular assimilation of genetic knowledge is the idea that we are all linked, 'connected in some way, although sometimes it's hard to know exactly how' (19). Rebecca feels comforted with the perspective that we all make part of the same whole, we all have a common ancestor, so it is possible to say that families are very alike. Every family, Rebecca believes, has its neurosis, hidden secrets, profound loves and unfulfilled dreams.

Chronologically, *The Family Tree* has three settings. Apart from the present in which Rebecca's narration takes place, readers have access to accounts set in the 1940s and the 1970s. Episodes from different periods are shuffled, producing a nonlinear narrative. While in the 1940s Rebecca's grandmother, Alicia, has a passionate affair with Cecil Johnston, a black Jamaican immigrant; in the 1970s Rebecca's and Tiffany's dysfunctional upbringing takes place in a middle-class house

with their parents, James and Doreen (described as a mad housewife). These episodes matter as they cast doubt upon Doreen's paternity. But most importantly, these episodes provide readers with a picture of three generations of women and the illnesses that may run in the maternal line – namely bipolar disorder and Alzheimer's.

In order to tell stories from the past, Rebecca relies on family written records and admits that she may have slightly embellished the facts. Alicia and Cecil fell in love in 1948 but their relationship was regarded as 'something edged with hostility' (250). One day the couple was caught in a guest house and it seemed convenient to conclude that, in that room, 'the coloured man [was] molesting the young lady' (277). Police authorities had put Cecil away and Alicia, pregnant, was forced to marry her first cousin, Herbert. This baby died while newborn. Cecil Johnston will only reappear in the plotline 52 years later, when Herbert is dead and Alicia is already suffering the first signs of Alzheimer's disease.

Doreen Monroe, Rebecca's mother, also suffers from a mental illness. She is 'manic depressive' (339). Doreen has an emotional breakdown during a family gathering to watch the wedding of Charles and Diana on the BBC. As a shocking secret is unveiled, Doreen locks herself in the bathroom and commits suicide. This violent episode partly frames Rebecca's anxiety about genetic influence. Her musings on nature and nurture undeniably touch on broader questions regarding the human condition but, at a personal level, what unsettles Rebecca is the possibility of ending up like her mother or grandmother.

By the end of the novel, Rebecca realises why Alistair asked her to volunteer for an experiment conducted in his lab. Rebecca was asked to go to Alistair's lab, once a month, where tests were run on her blood samples. The study was about a suspected link between bipolar disease and Alzheimer's, and researchers were working on a hypothesis about abnormalities in mitochondrial DNA. Since mtDNA is maternally inherited, Alicia, Doreen and Rebecca can be seen, here, as experimental subjects: '[m]y grandmother, my mother and me; fruit flies all' (340). By discovering she may have a genetic predisposition for mental illnesses, Rebecca eventually discovers why Alistair never wanted to have children – at least not with her.

Rebecca's ending is not auspicious. Alicia dies when Rebecca is newly divorced and eight-months pregnant. The pregnancy is a troubled one: Rebecca 'almost consigned her [the baby] to an NHS bin bag' (381). She becomes emotionally unstable (like her mother) and grows fatter (like her mother). Even though it is not

possible to say that this ending fully clarifies what role genes may play in human nature, Rebecca's outcome reinforces the idea that an individual cannot reinvent themselves and break free from family legacy – whether it emerges from nature, nurture or both.

### **David Mitchell's *Cloud Atlas***

Unconventional is a term commonly associated with David Mitchell, who is considered one of the most promising young British writers. His narratives are often non-linear, polyphonic and multilayered. *Cloud Atlas* is mentioned by reviewers as the best example of Mitchell's unconventionality, given that its action is played out in different times and places, anachronistically moving around the globe and unexpectedly joining characters such as a futuristic cloned waitress and a nineteenth-century American notary.

*Cloud Atlas* comprises six different narrative threads that are woven together in a kaleidoscopic plot structure. Due to this taste for nesting one story inside another, Mitchell's narrative structure has been compared to that of a Russian doll (Hrubes 2008: 34). It is often said to be the most ambitious of all David Mitchell's works, but not all reviewers agree. Although the novel has had a warm reception among British critics (Bissell 2004), the book was also described as 'simply too long' (MacFarlane 2004), 'a definite sense of déjà vu' (Tait 2004) and even 'unreadable' (Sanderson 2004)<sup>7</sup>.

The film directors Wachowski brothers and Tom Tykwer recently adapted this Booker Prize-nominated novel for the cinema. The cast includes stars such as Tom Hanks, Hugh Grant, Susan Sarandon and Halle Berry. After an initial anxiety about transforming the novel into screenplay, Mitchell confessed himself to be 'cautiously optimistic about the film' (Waters 2011). Film directors appear to have followed

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<sup>7</sup> As MacFarlane explains it: 'David Mitchell's third novel, *Cloud Atlas*, published this week by Sceptre, has already received rave reviews in such diverse publications as *The Times*, *Time Out*, *The Observer*, *Spectator*, *Big Issue* and *Times Literary Supplement*. However, it will not be receiving one on these pages, where we have a policy of not reviewing books which the reviewer has found unreadable. Our reviewer, Harry Mount, found Mitchell's work impossible to finish: "*Cloud Atlas* is wilfully confusing and impenetrable, jumping from 19<sup>th</sup>-century Sydney to 1930s Belgium to 1970s California, sometimes making the jump in mid-sentence.'"

Mitchell's advice: to disassemble the book like Lego and work on its pieces as autonomous parts of a whole.

Even though each of the six stories can also be read independently, they are all somehow connected. The novel overlaps those narratives in different times and places, each one with a distinct vocabulary, characters and writing style. 'Mitchell has [in *Cloud Atlas*] people communicate in a weird, unacknowledged manner between their different situations, contexts and historical periods', as Bradford notes, and there is no 'obligation to explain or justify their excursions from credulity and mimesis' (2007: 65). All narrations are interrupted and resumed later in reverse order – the sole exception is the sixth narrative, which stands as a whole right in the centre of the book. If we think of the six stories as numbers, the structure of *Cloud Atlas* can be represented in the following way: 1, 2, 3, 4, 5, 6, 5, 4, 3, 2, 1.

Apart from the protagonist of the first narration – Adam Ewing, a nineteenth-century notary – each main character inherits his or her predecessor's narrative in a recorded form. Adam writes a journal while crossing the Pacific in 1850. Readers gather from his travelogue that Adam trusts in the beneficent influence of progress and, as a man of his time, regards brutal subjugation in the colonies with detachment. The narration ends abruptly in a cliff-hanger, giving way to the second narrative: the young musician Robert Frobisher, in Belgium, 1931, becomes the amanuensis of a famous composer, Vyvyan Ayrns. The reader thinks that both narrations are unconnected, at least until the moment when we are told that Frobisher found and read a dismembered copy of notary's journal. In addition, Vyvyan Ayrns dreams about an underground café where all waitresses look alike and customers order soap as a main dish.<sup>8</sup> This is, in fact, a glimpse of the fifth section of the book, a narration about clones and molecular engineering entitled 'An Orison of Sonmi~451'. Resorting to these literary devices, Mitchell successfully interconnects the six narrative threads, always subjugating one to the next. The third story of *Cloud Atlas* brings in a journalist investigating a nuclear plant in 1970; and the fourth introduces a publisher with a potential bombastic best-seller on the desk. The fifth story, that of a clone called Sonmi~451, is the one I want now to focus on.

In an unspecified time in the future – 'approximately 2300' (Clute n.d.) – we

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<sup>8</sup> In *Cloud Atlas*, 'Soap' is a food source that contains 'amnesiacs and soporifix', mind-numbing drugs that are reminiscent of Aldous Huxley's soma (359). These fictional substances are used to ascertain submission among cloned individuals.



meet the character Somni~451 being interviewed by an archivist in charge of 'the Ministry of Testaments' (187). This ministry is an obvious nod to the Four Ministries described in George Orwell's *Nineteen Eighty-Four*. Somni~451 is a cloned human created for slave labour. Her oral testimony will be recorded in an orison, a silver egg-shaped device, and will be available to future historians interested in this large city ruled by corporations. Even though the transcription of questions and answers make us think of a trial or interrogation, it seems that the destiny of this 'rebel' genetically engineered fabricant is already determined. Somni~451's pre-execution testimony can also be interpreted as a very human attempt to survive through recorded words (Greer 2005).

In the light of the 'corpocracy' system, Somni~451 committed the crime of achieving a level of consciousness similar to that of non-cloned humans (the 'purebloods'). Unlike the 'purebloods', 'fabricants' are bred to work nineteen hours on end and drugged with a certain substance ('Soap') to the point where they have no complex thoughts. As in Huxley's *Brave New World*, curiosity and knowledge are therefore believed to be a deviancy among the 'psycho-genomically altered' workers. The sole purpose of cloned servants is to keep profitable business chains such as the Papa Song going, a fast-food restaurant where Somni~451 used to work as a waitress. By design, 'fabricants don't have babies' (192) – but 'purebloods' do when they are given birth licenses. Fabricants' lives are to be ended, and their bodies discharged, when they complete 12 years of duty. They are the ultimate product of a consumer society on the verge of its own consumption and degradation.

What follows Nea So Copros is 'the Fall' of the consumer world that witnessed Somni's execution. The sixth story, 'Sloosha's Crossin' an' Ev'rythin' After', which is the only story told without interruption, is a post-apocalyptic dystopia. It is set in a distant future in Hawaii and narrated by Zachry, an old tribesman who acts as a storyteller when almost all past (and written) knowledge has been forgotten. His audience is composed of apparently random outsiders who gather around a camp-fire to listen his recollections. In Zachry's stories, Somni reappears as an imaginary pagan goddess who inspires religious rituals. Somni's messages preserved inside the orison were retrieved by the Prescients, the only people who possess information about 'pre-Fall' social history and scientific advancement. The Prescients visit the Valley Tribes 'twice year' (259) to trade goods or services and, in such encounters, Zachry gets to know Meronym, a member of the Prescients. Most of Zachry's narrative focuses on

the period when Merorym stays with his family, so that Zachry can help her to reach the remains of a pre-Fall observatory in the island of Mauna Kea.

Merorym shares with him her interpretation about the silver egg-shaped device content: “*An orison is a brain an’ a window an’ it’s a mem’ry. . . . Its mem’ry lets you see what orisons in the past seen’n’heard, an’ keep what my orison sees’n’hears safe from f’gettin*” (290). This excerpt condenses an important idea connecting the six stories in *Cloud Atlas*: the transmission of narratives may be the only instrument left to humans to keep history from being repeated. Past events need to be reinstated in the memory, and the lesson to be learned from these events is that predatory impulses, which are presented in the novel as part of human nature and history, led both to the fall of civilization and the near end of humankind. When the sixth narrative thread comes to an end, the storytelling of the previous five narratives is resumed and *Cloud Atlas* ends where it began: in the Pacific Ocean with Adam Ewing. The spiral of history is ready to start spinning over again.

This chapter presented summaries of the six novels from the corpus. All these literary texts explore genetic themes with different degrees of sophistication and for different purposes. They constitute an imaginative response to a general set of genetic ideas pervasive in the culture. These ideas are pushed forward by popular science books, among other cultural products. In the following chapter, I provide an overview of the chief arguments of the most prominent popular science authors who write about genetics and human nature: Edward O. Wilson, Richard Dawkins, Steven Pinker and Steve Jones. Outlining these key ideas is relevant to understand how fiction writers may have responded to them in their novels.

## Chapter two

### Popular science authors

‘The new Darwinians have become the scientific superstars of our age. Their books dominate the science sections in every bookshop while they are increasingly called upon to pontificate about political and social issues from a Darwinian point of view. . . . This is a remarkable transformation in the understanding of what it means to be human.’ (Malik 2001a: 150-1)

Popular science books have been helping to spread evolutionary explanations of human nature since the 1970s (Dupré 2001). This trend intensified throughout the 1990s with a renewed interest in evolutionary biology and genetics. Best-selling authors such as Edward O. Wilson, Richard Dawkins, Jared Diamond, Matt Ridley and Steven Pinker have emphasised how evolution and gene selection account for the determinants of the human condition. They brought Darwinism not only to the field of economics and politics but also to questions of human behaviour and morality. These scientific accounts of human nature caught the attention of fiction writers, who responded to such ideas in their novels (Waugh 2005).

In this chapter, I shall summarize the key ideas of four selected popular science authors. They are Edward O. Wilson, Richard Dawkins, Steven Pinker and Steve Jones. These names were mentioned – among others – by my novelists in their novels or in their interviews. I chose to pay attention to these popular science writers due to their significance in this particular field of science writing. They play an important role in what Dijck (1998) calls the ‘genetic theatre’, the public space where several actors negotiate the meanings of genetics. If we want a better understanding of the dynamic process that takes place on that stage, we need to consider the stories about human nature that these science writers have to tell.

With the exception of Jones, these authors draw extensively on genetics and evolution in order to construct a portrait of human nature. They present us with a sociobiological view of humans. Wilson, Dawkins and Pinker fervently embrace Darwinian ideas to put forward a secular explanatory system that allows us to understand, through the lens of natural selection, who we are and why we are here. As

Wilson puts it: '[b]iology is the key to human nature' (Wilson 1995: 13). Jones is less enthusiastic. He cautiously stresses that not everything in modern society and human nature can be explained by evolution: 'Darwin himself was very reluctant to use his theory to explain human society' (BBC4 1999).

### **Edward O. Wilson: from social insects to human beings**

When Edward O. Wilson was writing *only* about social insects, his ideas were not regarded as polemical. Wilson became controversial when he moved from sociobiology applied to insects to sociobiology applied to human beings. Examining his bibliography we can easily detect when this move towards a naturalistic explanation for human nature took place.

In the final chapter of *The Insect Societies* (1971), Wilson suggests that the principles of population biology and comparative zoology – which, in Wilson's opinion, have worked so well in explaining the rigid systems of the social insects – should also be applied to vertebrates. The following book, *Sociobiology: the New Synthesis* (1975), is a lengthy volume that draws on the social behaviour of vertebrates. In its polemical final chapter, *Sociobiology* proposes another leap, this time crossing the human threshold. Wilson's subsequent book, the Pulitzer Prize-winning *On Human Nature* (1978), is entirely dedicated to sociobiology applied to humans.

Wilson (1975: 595) defines sociobiology as 'the systematic study of the biological basis of all social behaviour'. Regarded as the 'child' of population biology and ethology, sociobiology is sustained by the idea that some social behaviour, or even much of it, is genetically determined (Barash 1977). Wilson argues that all behaviour, both animal and human, is the result of a complex combination of heredity, environmental stimuli, and past experiences. Nevertheless, he believes that the key to understand human nature lies in biology. As to free will, Wilson considers it a self-delusion.

According to Wilson's view of human beings, self-knowledge is regarded as something created and operated by the 'emotional control centers' of the brain: the hypothalamus and the limbic system (Wilson 1975: 3). When we act towards a problem in an aggressive or thoughtful manner, we are not choosing to behave in this

or that way. It is those emotion-managers that are ‘bringing’ hostility or kindness into our consciousness. Critics of sociobiology argue that this view of human nature undermines the notion of moral freedom, according to which individuals make choices based on their experiences and cultural values. For Wilson, nevertheless, human mind is a product of natural selection – and, therefore, is ‘concerned’ with the survival of the genes. Humans are seen as organic machines whose purpose is to carry and reproduce genes. And human morality is merely a tool to achieve these goals. As Wilson (1975: 3) puts it:

‘In a Darwinist sense the organism does not live for itself. Its primary function is not even to reproduce other organisms; it reproduces genes, and it serves as their temporary carrier. . . . the individual organism is only their vehicle, part of an elaborate device to preserve and spread them with the least possible biochemical perturbation. Samuel Butler’s famous aphorism, that the chicken is only an egg’s way of making another egg, has been modernized: the organism is only DNA’s way of making more DNA. More to the point, the hypothalamus and limbic system are engineered to perpetuate DNA.’

The emphasis on genes as units of selection – rather than the whole organism – can also be found in Richard Dawkins’s *The Selfish Gene* (1976). To develop such an argument, Wilson and Dawkins have both drawn on the work of a number of theoretical biologists, in particular William D. Hamilton, Robert Trivers and George Williams (Ridley 2003).<sup>9</sup> Wilson’s and Dawkins’s view of human beings aroused violent responses among the academic community in the 1970s (Sterelny 2001).

Among the harsh critics we find the evolutionary geneticist Richard Lewontin, the psychologist Leon J. Kamin and the neurobiologist Steven Rose. In their

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<sup>9</sup> ‘It was [the British geneticist] Ronald Fisher who first clarified that evolution was little more than the differential survival of genes. And it was [American evolutionary biologist] George Williams and William Hamilton, together with their bulldogs Richard Dawkins and Edward Wilson, who finally spelled out the full and startling implications of this idea. Bodies, said Dawkins, were temporary vehicles constructed for the replication of genes, exquisitely designed by genes to grow, to feed, to thrive, and die – but above all to strive for reproduction. Bodies were the genes’ way of making new bodies.’ (Ridley 2003: 236)

collective manuscript *Not in Our Genes* (1984), Lewontin, Kamin and Rose dedicate an entire chapter to attacking *Sociobiology: The New Synthesis*. They describe how popular the release of the book was, and explain why Wilson ‘soon attained a considerable celebrity’:

‘Harvard University Press, using the full panoply of public relation devices – including full-page advertisements in the *New York Times*, author-publisher cocktail parties, prepublication reviews and interviews on television, radio and in popular magazines – issued a book on evolutionary theory by an expert on ants.’ (Rose *et al.* 1984: 233)

The emphasis on Wilson’s expertise on ants seems to suggest that, to some extent, the entomologist proposed a new scientific discipline that went beyond his proficiency. The 600-page book written by Wilson includes such subjects as mathematical population genetics, neurobiology, and primate taxonomy, providing a theoretical frame for the whole natural world. A few years after the release of *Sociobiology*, ‘devastating critiques’ of Wilson’s arguments began to appear, including the influential 1979 paper by Richard Lewontin and Stephen Jay Gould (Dupré 2001: 20). Entitled ‘The Spandrels of San Marco and the Panglossian Paradigm: a Critique of the Adaptationist Programme’, this paper argues against the idea that every conceivable trait of an organism must be an adaptation. It does so by drawing on a metaphor inspired by Venetian mosaics. According to Lewontin and Gould, we cannot always explain a certain feature by invoking functions that allegedly justify its selection over evolutionary time. Particular features emerge as a result of constraints imposed by the overall structure and functioning of an organism. Similarly, the spandrels in the cathedral of San Marco in Venice were not designed to display mosaics. Their primary function is to hold up the ceiling; the allegorical mosaics are simply a side-effect of the arch construction.

Critics argue that the academic and popular appeal of sociobiology lies in its claim to explain all human nature. *Sociobiology* offers, according to Lewontin, Kamin and Rose, ‘an ambitious programme to explain and prescribe for the entire human condition beginning with a few basic principles’ (Rose *et al.* 1984: 235). Critics appear to be specially unsettled by Wilson’s prediction of societies in the future, a time when neurobiologists and sociobiologists ‘will provide the necessary knowledge

for ethical and political decision in the planned society' (Rose *et al.* 1984: 234). The authors of *Not in Our Genes* conclude that it is not enough for Wilson to explain the human condition, the sociobiologist also wants to modify it. This statement is a response to the promises and forethoughts Wilson offered on the last page of *Sociobiology*: '[i]f the decision is taken to mould cultures to fit the requirements of the ecological steady state, some behaviours can be altered experientially without emotional damage or loss of creativity' (Wilson 1975: 575).

The idea that every detail of human culture and behaviour is genetically determined also legitimizes the current *status quo*, suggest Rose, Lewontin and Kamin. Reductionist and biological determinist approaches reinforce the notion that little can be changed in the arrangements of society. Exploitation and aggression, for instance, are regarded as part of human nature. If employers exploit their employees, it might be said that evolution provided employers with the entrepreneurial genes that workers lack. In such terms, reductionism and biological determinism are regarded by critics as ideological and political instruments.

In *On Human Nature*, Wilson restates that the human condition ought to be investigated by natural scientists and their preferred method, the reductionist one. Whereas reductionism has proved to be a successful approach in natural sciences, critics of sociobiology argue that it cannot be used to study human beings as our traits derive from both social and natural adaptations. Therefore it is not possible to explain human behaviour in purely biological – physical – terms (see Malik 2001a: 258-267). Critics insist that human nature cannot be seen as a phenomenon reducible to simple laws. And claim a distinction between methodological reductionism and ontological reductionism. As Peters puts it:

'We simply must grant that reductionism as a method that focuses on the genes as the object of research has been extremely valuable in the production of new knowledge. No one would want to surrender it. Yet, to extrapolate on the success of what is being learned about genes in order to build a philosophical worldview – a worldview that says if we only keep studying DNA we will find that "it's all in the genes" – commits the fallacy of hasty generalization. Human being – that is, human ontology – may very well be the result of numerous factors, only one of which is DNA. To know for sure, we need to study humanity at all levels from the

cell on up through physiology to society and even to spirit.’ (Peters 2003: 53)

But because Wilson (1995: 10) believes that ‘the deep structure of human nature’ is ‘an essentially biological phenomenon’, he argues that a reductionist approach is then compulsory to understand the human mind. In these terms, particular features of human behaviour such as love and religious belief become legitimate objects of scientific inquiry.

At the same time Wilson encourages the study of human nature using the methods of natural sciences; he envisages that it is possible to present an *interdisciplinary* explanation on almost all human behaviour. As Wilson (1995: 6) states in *On Human Nature*: ‘[t]he only way forward is to study human nature as part of the natural sciences in an attempt to integrate natural sciences with the social sciences and humanities’. The blending of biology and the various social sciences is also the core claim presented in another of Wilson’s books, *Consilience: The Unity of Knowledge* (1998). This claim is perceived by critics as an imperialistic move to monopolise the study of the human condition:

‘The nostalgia for the lost narrative is not dead. And the expansion of the biological sciences, and with it a new oracular expansionism in the nature of scientific claims, is one of the major reorientations of intellectual culture between the 1980s and the 1990s. Certainly it changed the nature of relations between scientific and literary cultures. . . . the shift towards the biological sciences in the 1990s produced a stream of “consilience” books by prominent scientists which represented clearly imperialistic moves by science, in turn, to appropriate those areas of cultural value, such as questions of human purposes and ends, traditionally reserved for humanities.’ (Waugh 2005: 71)

Waugh’s argument is a valid one. But Wilson’s expansionist desire predates the ‘stream of consilience books’ in the 1990s. When *Sociobiology* was first published, back in 1975, Wilson’s approach to human morals was already clear: ‘[t]he time has come for ethics to be removed temporarily from the hands of philosophers and biologised’ (1975: 287). Today, Wilson (1998: 7) continues to argue for the linkage of



the sciences and humanities as it could offer ‘the value of understanding the human condition with a higher degree of certainty’. What really changed in two decades is not the expansionist desire, but the attitudes towards sociobiology: the initial violent response was replaced by a wave of popular acceptance punctuated by occasional critiques.

### **Richard Dawkins: from genes to memes**

The idea of organisms as ‘vehicles’ responsible for carrying and transmitting genes, as seen in Wilson’s seminal text published in 1975, reappears one year later in Richard Dawkins’s first and most famous book: *The Selfish Gene*. Both Wilson and Dawkins brought to science books a new way of looking at the genes in a Darwinian context. But it was with Dawkins’s skilful metaphors, however, that genes gained attitude and became a sort of personified agency. As Malik (2001a: 151) puts it: ‘I doubt if there has been a more evocative scientific metaphor in the modern age than that of the “selfish gene”, nor a book with greater impact on the public consciousness’.

Dawkins’s metaphor illuminates the argument that natural selection operates at the level of the gene – and not of the species, nor even of the individual. The gene is the unit of selection. From an evolutionary point of view, genes and organisms have different roles. Organisms are vehicles, their utility resides in passing the genes on to the next generation. Individuals die but their genes are potentially immortal. The immortality of the genes depends on their selfishness: the selfish genes are able to survive at the expense of their rivals. Rather than group selection, *The Selfish Gene* emphasises the role of gene selection in evolutionary biology. The group selection theory proposes that natural selection operates between groups of organisms rather than between individuals. As Dawkins puts it:

‘If selection goes on between groups within species, and between species, why should it not go on between larger groupings? . . . I shall argue that the fundamental unit of selection, and therefore of self-interest, is not the species, nor the group, not even, strictly, the individual. It is the gene, the unit of heredity.’ (Dawkins 2006: 11)

Despite the ‘selfish’ in the title, Dawkins claims that the book actually devotes more attention to altruism. It draws on the role of individual altruism in promoting the replication of genes. Let us pick one of Dawkins’s examples: if a small bird chirrup after spotting a hawk, it alerts the other birds to the imminent danger but becomes itself a vulnerable prey. Why would an organism make that sacrifice? The answer lies in the genes, according to Dawkins, and not in an honourable act for the good of the group. This gene-centred view of evolution explains why an organism, for the genes’ sake, may benefit another one in the expectation of future reciprocation.

Similarly to what happened to Wilson and his *Sociobiology*, *The Selfish Gene* was accused of biological determinism. Both Wilson’s and Dawkins’s ideas on genetics were regarded by their opponents as an ‘integrated reductionist worldview’ (Rose *et al.* 1984: 59), drawn explicitly on what Francis Crick referred to as molecular biology’s Central Dogma. It postulates that biological information flows in one direction (DNA to RNA to proteins), suggesting that DNA is the only causal agent. Lewontin, Kamin and Rose also claimed that such a reductionist view of humans could easily be used to maintain and justify inequities in society. This politicized interpretation of Dawkins’s book suggests that sociobiology works ‘as a justifier for that social order – as, for instance, when economists describe monetarist theories as in accord with the biological condition of humanity’ (Rose *et al.* 1984: 60). Other critics equally objected to what they regarded as obnoxious economic, social and political implications of Dawkins’s most popular book.

In 2006, in the introduction to the thirtieth anniversary edition of *The Selfish Gene*, Richard Dawkins answered these critiques. He argued that one of the dominant messages of his book is precisely that society should not derive its values from evolutionary biology. Dawkins (2006: xiv) wrote that our ‘brains have evolved to the point where we are capable of rebelling against our selfish genes’, mentioning contraceptives as evidence of this. Therefore, the ‘same principle can and should work on a wider scale’ (2006: xiv). In so writing, Dawkins wanted to show that there is room for change within the frame of genetic determinism.

*The Selfish Gene* is not only about genetics. The final chapter of the book is dedicated to human culture. In that section Dawkins argues that his theory of gene selection cannot satisfactorily explain products of cultural human evolution such as architecture and literature. The argument of ‘biological advantages’ does not offer, in Dawkins’s opinion, an explanation for every feature of the human condition.

Dissatisfied with analogies between cultural and genetic evolution prompted by fellow Darwinian scholars, Dawkins advances the concept of a new replicator: the memes.

Memes are units of cultural transmission or imitation. In other words, memes are information that is copied from person to person. They can be ideas, songs, poems or choreographies, for instance. Memes replicate themselves by the spoken and written word, and thus manage to get spread from brain to brain. In Dawkins's model, there is no 'biological advantage' in ideas spreading around because memes are *not* organic replicators. Dawkins notes that the focus here moved from one unit to another: from genes to memes. The fittest memes survive because they have greater 'psychological appeal' compared to other memes in the meme pool – and not because they confer any 'biological advantage' to their vehicles.

The reason why Dawkins came up with the concept of memes cannot be neglected: '[t]he original didactic purpose of the meme was the negative one of cutting the selfish gene down the size' (Dawkins in Blakemore 1999: xvi). Aware of the fact that biologists are gene-obsessed, Dawkins wanted to leave a word of warning in a book completely told from the perspective of the gene. This final message was: there are many possible forms of evolution. Genetics is just one of them.

Dawkins wanted to leave a positive note at the end of the book – and memes helped the author to serve this purpose. Since a gene-centred view of natural life is not as reassuring as religion, for instance, Dawkins felt it was necessary to offer readers a cheerful final message. Thus Dawkins observes that our collection of immortal genes is not as immortal as memes can be:

'I have been a bit negative about memes, but they have their cheerful side as well. When we die there are two things we can leave behind us: genes and memes. We are built as gene machines, created to pass on our genes. But that aspect of us will be forgotten in three generations. . . . Our genes may be immortal but the collection of genes that is any one of us is bound to crumble away. . . . *We should not seek immortality in reproduction.* But if you contribute to the world's culture, if you have a good idea . . . write a poem, it lives on, intact, long after your genes have dissolved in the common pool.' (Dawkins 2006: 199 emphasis mine)

According to Dawkins, successful replicators ideally meet the following criteria: fidelity, fecundity and longevity. Dawkins's argument for long-lasting memes presents cultural products as an alternative to the genetic legacy. However, this claim is not consistent with the importance that Dawkins himself gives to imitation. A poem will live on intact only as words on the page. There is no guarantee that the poem, despite its aesthetic qualities, will be popular and spread from brain to brain. If it is never read, its value will be the same as if it was never written – at least for memetic purposes. On the other hand, should the poem become popular, it will be possibly imitated, misquoted or fragmented. Being copied with low fidelity, the poem will vanish like a collection of genes after the third generation. Like genes, memes are only potentially immortal.

### **Steven Pinker: the modular nature of human behaviour**

The cognitive scientist Steve Pinker believes that, in modern society, it became a taboo to consider that genetics plays a role in human nature. This happened, he claims, because people fear that acknowledging a naturalistic view of human nature implies a variety of negative outcomes. Some of them are the fatalistic acceptance of violence and exploitation, for instance, or the discouragement of social equity. In his book *The Blank Slate: The Modern Denial of Human Nature* (2002), Pinker resorts to evolutionary psychology to discourage those fears. Since the modern sciences of genes and evolution are constantly changing our view of ourselves, it is time now to embrace 'a realistic, biologically informed humanism', Pinker (2002: xi) argues.

*The Blank Slate* combats the tabula rasa model of human nature. This doctrine holds that human beings are born with no innate mental content. As such, the mind is regarded as a white canvas waiting to be painted according to social experiences. In other words, the tabula rasa model suggests that only nurture – and not nature, or a blend of both – can increase human knowledge and optimise chances of survival and success. In his book, Pinker (2002: 421) explains why the blank slate is an 'attractive view' of humans. If we believe that every aspect of human behaviour depends entirely on the environment, then sexism, racism and prejudice could be hypothetically destroyed as they are not rooted in human nature. Despite the fact that such a worldview is a comforting concept, Pinker argues that it cannot be accepted since the

modern sciences of mind, brain, genes and evolution are increasingly showing that it is wrong.

Pinker's view of human nature is similar to the one Wilson and Dawkins put forward in the 1970s. What changes in Pinker's discourse is a particular emphasis on the brain and language as research subjects, as we will see below. Another difference is the scholarly label under which his work is presented: Pinker is associated with evolutionary psychology, rather than sociobiology. There is a historical reason for this. Sociobiology became more and more ostracized in the mid-1980s, after a series of 'devastating critiques' of Wilson's and colleagues' arguments (Dupré 2001: 20). Speculations about the implications of evolutionary theory to human nature began to be presented under the rubric of evolutionary psychology. In reappearing 'under a different disguise', sociobiology continued spreading evolutionary speculations about human behaviour (Dupré 2001: 21). There are differences between sociobiology and evolutionary biology, but their core ideas are convergent (see Malik 2001a: 192-7). As Peters (2003: 39) put it:

'With design modifications and relabeling, sociobiology is back on sale under different names: behavioural ecology, Darwinian anthropology, evolutionary psychology, and evolutionary psychiatry. Its appeal is that it draws upon science but builds a worldview that is totalistic in its explanation of what is meaningful to our lives. . . . With evolutionary psychology we buy the gene myth in the large economy size.'

Evolutionary psychologists' approach to investigating human behaviour is based on an understanding of the structure of the brain. One of the aspects that distinguishes them from sociobiologists is precisely this modular approach. While sociobiologists might talk about the evolution of a particular behaviour, evolutionary psychologists discuss instead the psychological modules for that behaviour. In his book *How the Mind Works*, Pinker suggests that mental activity is a form of computation that takes place in a neural computer as much shaped by natural selection as any other body organ. The mind is also described as a sort of Swiss army knife, a machine equipped with devices specialized during Pleistocene age. Each of those tools – or *modules* – helped our forebears to cope with social or environmental issues. These modules are designed to produce a specific behaviour only in particular

circumstances. This circumstantial aspect helps to mitigate charges of biological determinism that turned sociobiology into a very controversial discipline: the fact that an organism has a module does not imply, according to evolutionary psychologists, that it will perform the behaviour that the module is designed to produce.

In Pinker's Swiss army knife model, there is a language module too. Pinker investigates language as the product of a unique process in human evolution, arguing that it is an adaptive feature. In *The Language Instinct*, Pinker claims that humans draw on the instinct to learn, speak and understand language. He aims to show readers that language is not a cultural artefact that we learn. Rather, it is 'a distinct piece of the biological make up of our brains', a specialized skill that develops spontaneously during childhood (Pinker 1994: 18). This is why Pinker prefers to call it an instinct whereas some cognitive scientists have defined language as a mental organ or a psychological faculty.<sup>10</sup> 'Language is no more a cultural invention than is upright posture', writes Pinker (1994: 18).

Even though evolutionary psychology did not arouse the same vitriolic critiques sociobiology received in the 1970s, it has also been charged with putting forward a debatable view of human nature (Dupré 2001, Jackson & Rees 2007, Malik 2001a, Peters 2003). The vision of humans conveyed in popular science books such as Pinker's are, according to critics, reductive and simplistic. Evolutionary psychology is accused of being too ambitious about a subject – human nature – whose inquiry is not compatible with the analytic methods of science. In addition, critics stress that the idea of having a single scientific (or pseudo-scientific) narrative accounting for all human behaviour became worryingly appealing to the general audience. As Dupré (2001: 184) puts it:

' . . . there is much rubbish to be cleared away. Any bookshop will display a fair selection of sometimes best-selling volumes devoted to simplistic accounts of the essence of human nature, and the authors of these works are constantly to be read or heard peddling their wares in the middle-brow print and broadcast media. One might mention, for instance, Steven Pinker's physically if not intellectually weighty, but very widely noticed,

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<sup>10</sup> Unlike the linguist Noam Chomsky and others, Pinker does not believe that human ability for language is a by-product of other adaptations. Steven Pinker and Noam Chomsky diverge on that subject, but their general ideas on language and cognition are similar.

*How the Mind Works*. The view presented therein, that the mind is a computer programmed by natural selection in the Stone Age, is as reductive and simplistic an approach to its topic as anyone is likely to seriously propose, and is as lacking in serious insight into the human condition as such an attempt is likely to prove. Yet this is the work of a respected scientist and is treated with considerable public interest. This points to an intellectual pathology well worth critical attention.’

Dupré argues that evolutionary psychology wants to provide a comprehensive portrait of human behaviour using very few fragments of the whole picture. In his opinion, ‘an adequate view of ourselves, were we to acquire one, would include many parts’, namely an account of us as genetic creatures with ‘immensely complex functioning parts’ and an account of how from such functioning emerged the equally complex human capacities (Dupré 2001: 183). Malik has a similar view. He notes that the allegedly innate and modular nature of human behaviour is not ‘the critical empirical discovery’ of evolutionary psychology – it is, in fact, ‘something imposed *a priori* on the field of assumptions . . . because its premises define a programme incapable of finding anything else’ (Malik 2001a: 284).

Critics of evolutionary psychology argue that the current scientific vision of human nature tends to reify individuals, favouring a perception of humanness as something pertaining to the animal or machine realm (Malik 2001a). This perspective often associates human nature more with fatalism and violence rather than with rational choices. Aiming to react against such an idea, Pinker has recently published a book casting human nature in a positive light: *The Better Angels of Our Nature* (2011).

In the preface, Pinker reminds us that the way we interpret signs of trends in violence depends on our conception of human nature. Pinker wants to put forward the idea that moral progress is compatible both with a biological approach to the human mind and with an acknowledgement of the dark side of human nature. As Pinker (2011: xxi) puts it:

‘Though theories of human nature rooted in biology are often associated with fatalism about violence, and the theory that the mind is a blank slate is associated with progress, in my view it is the other way around. . . . The

belief that violence has decreased suggests that we started off nasty and that the artifices of civilization have moved us in a noble direction, one we can hope to continue.’

In order to support what he calls ‘the civilization process’<sup>11</sup>, Pinker demonstrates that our era is less violent, less cruel and more peaceful than any previous period of human existence. He wants to convince readers that society should be optimistic about the future of civilization, an idea anchored in the belief that progress is an unstoppable march forward. More importantly, Pinker wants to persuade ‘a large swath of our intellectual culture’ that it is not a crime ‘to admit that there could be anything good about civilization, modernity, and Western society’. But there is no guarantee that ‘the trend he [Pinker] has documented will continue’, as Singer (2011) notes in his enthusiastic *New York Times* review of the book.

Pinker is not alone in trying to brighten up the views of human nature anchored on biology. Matt Ridley has also recently published a book against the current association between scientific theories of human nature and ideas of violence and primitiveness. In *The Rational Optimist – How Prosperity Evolves*, Ridley (2011) wants to convince the reader that the economy is the dominant source of human progress. The title of his book bears words with positive connotations, evoking optimism and wealth. Evolutionary psychologists now appear to be reversing the trend that associates biological explanations of human nature with negative aspects of humankind.

### **Steve Jones: the limits of genetics as an explanatory tool**

The geneticist Steve Jones ascribes to genes little power in explaining the human condition. He also regards with scepticism the sociobiological approach to human behaviour. From Jones’ point of view, sociobiology not only offers theory without observations or tests but also attempts to provide – despite its methodological limitations – an all-encompassing narrative into which the whole natural world is supposed to fit (Jones 2009). Similarly, Jones distances himself from the arguments of

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<sup>11</sup> Pinker borrows this term from the sociologist Norbert Elias.



evolutionary psychology. His vision of human nature appears to be materially grounded but not guided by reductionism or biological determinism. In this sense, Jones gestures towards Richard Lewontin's and Stephen Jay Gould's vision of the limits of genetics and evolution as explanatory tools.<sup>12</sup>

*The Language of the Genes* (1993) was the first of a series of seven popular science titles published by Steve Jones over the last two decades. It is a book about what genes can – and cannot – tell about ourselves. Jones does not expect genetics to unveil the inner workings of the human condition:

'It is the essence of all scientific theories that they cannot resolve everything. Science cannot answer the questions that philosophers – or children – ask: why are we here, what is the point of being alive, how ought we to behave? *Genetics has almost nothing to say about what makes us more than just machines driven by biology, about what makes us human.* These questions may be interesting, but scientists are no more qualified to comment on them than is anyone else.' (Jones 1993: xi, emphasis mine)

It is clear that Jones does not ascribe the main role in shaping human behaviour to genetics. For him, the culture that humans have created has very little to do with evolution in the Darwinian sense. Therefore, in Jones' opinion, natural sciences are not necessarily more equipped than humanities or social sciences to answer questions about human nature. This perspective positions Jones far away from sociobiologists like Wilson, who argues that the 'only way forward is to study human nature as part of the natural sciences' (Wilson 1995: 6).

Sociobiology is 'obsessed with sex', suggests Jones. Using sex as an explanatory device, 'you can make a sociobiological explanation of anything you like' (Jones 2009). Therefore, according to Jones, every approach to a new sociobiological problem implies the same explanation: the survival of the genes. But if the answers are known a priori, Jones argues, this is a 'misunderstanding of the nature of science' – as 'a theory is no good without observations and tests', and there are no tests in sociobiology (Jones 2009). Jones adopts a similar posture regarding evolutionary

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<sup>12</sup> Steve Jones worked with Richard Lewontin during his post doctorate at the University of Chicago.

psychology. He also thinks that the problem is that the discipline produces ‘obviousness disguised as insight’:

‘To a lot of evolutionary psychologists, though, everything in human society – war, peace, rape, marriage, the lot – can be explained by the pressure to pass on genes. But if everything can be explained, then nothing can be explained. You don’t need any experiments, it’s in the great Darwinian Bible. I’ve seen evolutionary explanations of acne, of gossiping, of ballroom dancing, the lot. It’s a parlour game called name and explain.’ (Jones 2000)

Even though Jones acknowledges that ‘certain aspects of human behaviour descend with modification from the past’, he feels uncomfortable with the ‘huge penumbra of pseudo-science’ around evolutionary psychology (Jones 2000).

Apart from *The Language of the Genes*, Steve Jones’ most popular books are *In the Blood: God, Genes and Destiny* (1996) and *Y: The Descent of Men* (2003). *In the Blood* was written together with a BBC TV series with the same name, although the published material covers more ground than the six-part series itself. The book draws on ancient beliefs about human nature, including the widespread conviction that destiny is inborn. From the sacred scriptures to the enormous data provided by the modern biology, Jones questions what really is ‘in the blood’ and exactly what this meant – and still means – to our society.

*Y: The Descent of Men* introduces the thesis that the male sex is in decline. Throughout the book, Steve Jones discusses evidence for it. An example: the female holds the material that will keep reproduction going, whereas the male only offers some material to be reproduced. This material is of great utility given that, otherwise, women would produce offspring genetically redundant. Reproduction is portrayed as a competition, an ‘active, bitter and ancient battle of the sexes’, in which females fight to be in control and to limit male influence (Jones 2003: 18). As Jones (2003: 18) describes it: ‘[m]ales are, in many ways, parasites upon their partners. Their interests are to persuade the other party to invest in reproduction, while doing as little as they can themselves’.

Towards the end of *Y: The Descent of Men*, Jones tackles the old nature versus nurture debate. The author argues that the majority of behaviour is due to social

environment but that genes have, indeed, a significant influence on some aspects of this environment. He explains that there is typically far more diversity due to cultural effects than to genetics, adding that most of the differences between the two sexes are more environmental than innate.

This chapter outlined key ideas from four popular science writers: Edward O. Wilson, Richard Dawkins, Steven Pinker and Steve Jones. In doing so, it provided an overview of what their views of human nature are. We have seen that Wilson, Dawkins and Pinker support a naturalistic portrait of the human condition. They regard human nature as a product of natural selection. Conversely, Jones argues that Darwinian evolution cannot explain every human feature. He also regards evolutionary psychology with a degree of suspicion. This overview of some of the most influential popular texts dealing with human genetics and evolution will help us to contextualize, in the following analytical chapters, how such ideas are incorporated and explored in the novels from our corpus.

## Chapter three

### Methodology

This chapter outlines my methods for gathering and analyzing my research data. I also describe here the interviewing, sampling, transcribing and coding strategies adopted.

The broad objective of this research is to examine to what extent modern genetics has influenced contemporary novelists to adopt a more deterministic view of human beings. Interviews and textual analysis were chosen as my main research methods. My initial hypothesis was that if gene-centred disciplines were really challenging our traditional ideas of humankind, then they would have implications for a literary genre that depends so much on representations of humans. Thus, my research questions are:

- Have British novelists been influenced by genetics to take a more deterministic view of human nature? In what ways?
- What sort of stories are these writers able to tell? And how have humans been represented in these narratives?
- How do these authors deal with scientists' cognitive authority and the associated rhetorical boundaries between science and society with which experts can protect their privileged status (Hilgartner 1990)? Do writers challenge such boundaries?

The six novels analysed in this study touch in some way on human genetic research, or its medical possibilities (see Appendix II). The key questions above guided the reading and analysis of the texts. While analysing the novels, I sought to uncover the ways in which the human characters deal with – or are constrained or empowered by – scientific products or concepts. In addition, I tried to understand what my novelists know and think about human genetics and whether they believe it influenced their stories. I undertook interviews with all the authors as part of my data

gathering and analysis. Interviews were conducted with the following contemporary British novelists: A.S. Byatt, Carole Cadwalladr, Margaret Drabble, Maggie Gee, Simon Mawer and David Mitchell. Given the small sample size, and the exploratory nature of this study, the analysis presented in this thesis is qualitative.

The novelists I interviewed discussed their books a considerable time after writing them. For example: Simon Mawer, who published *Mendel's Dwarf* in 1997, was interviewed in 2009. Can we expect an interviewee to remember exactly what he used to think a decade ago? Mawer has probably added much more information and experience to his views on genetics than he used to have in 1997. Philosophically, one must acknowledge that the authors interviewed are not the same as those who wrote the novels analysed in this study. Nevertheless, interviewing authors remains a useful method to gain a better understanding of how the new genetics has been integrated in British fiction.

Interviews constitute a research approach which can give in-depth descriptions of a world that cannot be directly observed. As Arksey and Knight (1999: 32) argue, 'interviewing is a powerful way of helping people to make explicit things that have hitherto been implicit – to articulate their tacit perceptions, feelings and understandings'. These articulations are naturally human constructs. They are representations that become part of a narrative in which the interviewer has an active role.

I believe this research can give consistent accounts of thoughts, feelings and actions of a group of novelists. But we should note that these writers are only part of a large cast of actors involved in the production of cultural meanings of genetics. An account of their motivations and aims will not apply to all cultural producers nor does it 'allow predictions to be made in the way that they are made in the positivist natural sciences' (Arksey & Knight 1999: 10).

### **Sampling the data**

The sampling process started off with a search for contemporary novels that explored the theme of human genetics in their narratives. The authors of these novels were automatically considered as potential interviewees. On the other hand, only the novels whose authors agreed to be interviewed were considered in the final version of this

study. This means that the selection of literary novels to be analysed conditioned the interview sampling and vice-versa. Therefore, the approaches used to perform the former and the latter cannot be addressed separately. I begin outlining the criteria adopted for choosing my literary corpus.

The novels selected met the following criteria:

- To be a literary novel (to limit the broad range of related genres in fiction, I did not consider crime novels and science fiction)
- To explore human genetics in their narratives
- To be written by British authors
- To be published in the United Kingdom over the period from 1997 to 2007

My criteria for inclusion in a preliminary corpus required, as mentioned above, the discussion of matters somehow related to human genetics. This means that I am only interested in fictional texts that overtly explore such a theme within their narratives. I did not consider cases in which modern genetics have influenced literary novels in subtler ways, covertly conditioning their forms or structures (e.g. Thiher 2005). I also chose the period from 1997 to 2007 because it was the decade preceding the start of my research.

To locate my novels, I began searching in selected bibliographies. The literary texts analysed in this study were identified using two directories of books containing scientific information in their narratives. One is a British Council commissioned catalogue entitled 'Hunting down the Universe: a select science and literature bibliography' (British Council 2003). This selection was published in August 2003 and includes an introduction by Margaret Drabble. The other was the Lab Lit List, a bibliography that contains titles of novels that depict 'fairly realistic scientific practice or concepts, typically taking place in a realistic – as opposed to speculative or future – world' (Lablit n.d.). To ensure a complete list as possible, I also searched on specialised sites on the Internet such as Amazon UK and blogs dedicated to science and literature. Different combinations of the following key words were used in all searches: 'genetics', 'biotechnology', 'gene', 'novel', and 'fiction'.

Thirteen novels meeting the criteria above were identified (see Appendix I). They were written by eleven authors, all of them considered potential interviewees. I

made no decisions based on gender or bookselling figures. I depended on authors' agreement on being interviewed to define my final list of novels to be analysed (see corpus in Appendix II). This is why some novels initially identified as suitable were not considered in the final version of this thesis. For example: should Zadie Smith have agreed to talk about *White Teeth*, then this study would have one more analytical chapter, dedicated to hybridity (see Soares 2009).

Interviews requests were sent on the 8<sup>th</sup> June 2009 by e-mail to the novelists' literary agents and/or publishers. Receipt of delivery and reading were requested in order to guarantee that no message was lost or undelivered. Arksey and Knight's recommendations on interviewing élites were followed (Arksey & Knight 1999: 122-4). I considered that novelists could fall into this interviewee category because, like leaders and experts, they exert influence in a particular social sphere and have busy agendas. Obtaining access to established authors can be similarly difficult depending on their celebrity status (English & Frow 2006). Such problems limited the possibility of scheduling a second interview with each author. Ideally, interviews should have been carried out in two phases.

Seven out of eleven novelists agreed to being interviewed for the purposes of this thesis, two of them on the condition of answering the questions via e-mail (A.S. Byatt and David Mitchell). Sebastian Faulks was one of the authors interviewed, even though the data collected was not considered in the final version of this study, as I will explain below. As to the four remaining novelists, I was informed by their respective literary agencies that Doris Lessing was 'not doing any interviews for the time being', Zadie Smith was 'unable to take it on' and Kazuo Ishiguro was 'extremely busy with work' and therefore was 'not participating in interviews'. Ian McEwan's agency did not reject my interview request, but was never able to arrange it due to the author's very tight schedules.

I had never met my interviewees before. This means that, before performing the interviews, I had no guarantee that my respondents were informed and articulated about matters arising from my research questions. Nevertheless, I considered them knowledgeable informants as the themes explored in their texts suggested that they were very likely to be interested in a discussion about genetics in fiction. My assumption was also based on the sort of projects and public events in which they participated. Maggie Gee, for instance, took part in a collection of essays discussing the validity of naturalistic explanations of human behaviour (Malik 2001b). As

mentioned earlier in this chapter, Margaret Drabble wrote the introduction of the science and literature catalogue 'Hunting Down The Universe' (British Council 2003). A.S. Byatt is also regularly invited to explore the intersections between science and art in public events and commissioned projects (Waugh 2005, Webster 2008).

### **Approaches to interviewing**

The interviewing approach used in this study is commonly described as the active interview (Gubrium & Holstein 1995, Silverman 2006). Considering that interviews are social productions, they should be regarded as a storytelling exercise in which interviewer and respondent work together to actively construct a narrative and its meaning (Gubrium & Holstein 2002). Thus, interviewing is a collaborative process in which the interviewer is an active participant, playing a decisive role in shaping significance.

Qualitative interviews were chosen as they are better able to explore more personal understandings. Rather than survey methods, which usually do not concentrate on individualistic features, interviews provide not only a wealth of detail but also more accurate responses on sensitive issues. Even though novelists' perceptions of human nature are embedded in cultural and social contexts, they are explored in this study in the light of the interviewees' personal and literary experiences.

The interview model I decided to use is the semi-structured, one-to-one interview. This interview approach offers a basic structure previously planned by the interviewer, but leaves room to follow unexpected leads or even to probe further when needed. Given the complex character of my research themes – genetic determinism and personal views of human nature – it would be inappropriate to choose an interview approach with formalized, limited set questions (such as the structured model).

The semi-structured interview was also chosen because I needed an approach that could offer, at the same time, both flexibility and structure. Flexible questions suited my research objectives as they encourage the use of follow-up questions so as to elicit further comments. In so doing, they provide a better understanding of the interviewee's perceptions, experiences and opinions. I also wanted the freedom to



adjust questions (or the order in which they would appear) to the interview context or to the interviewee's personality. On the other hand, a basic structure was equally necessary as I had a definite framework of themes to be explored. If I wanted to discuss particular topics of specific novels, for example, I needed to have an interview guide at hand in order to efficiently focus the conversation and, thus, have time to cover all desired topics.

Lindlof and Taylor define an interview guide as a 'grouping of topics and questions that the interviewer can ask in different ways for different participants' (2002: 195). In this study, however, an interview guide was prepared for each interviewee. As novelists were expected to discuss my research themes in the context of their own novels, few standard questions could be asked to all interviewees.

### **The interviews**

I carried out five interviews in person and two via e-mail from August 2009 to February 2010. An interview guide was used in every interview conducted in person. The objective was to ensure that all the main issues I wished to explore had been covered. The guide included two topics that were explored in all interviews, as shown below:

- There is something that puzzles me: how do you perceive your characters in bodily terms? In your mind, are they made of flesh and blood? Are they human? Can you help me understand that?
- To write your novel, what sort of research have you done about science? Which books, documentaries etc. were particularly useful to you? Have you been helped by scientists? By whom and in which ways?

The first question was designed having in mind the importance of building trust and rapport. This process often involves 'putting something of the interviewer-self into the interview' or 'raising similar or different experiences' (Arksey & Knight 1999: 39). It was also formulated to settle the interviewee and introduce the theme of views of human nature and their representation in fiction. I include in the Appendix

IV an excerpt of an interview transcript. The objective is to give an idea not only of how this first question introduces my research theme but also of the nature of the subsequent exchanges.

The remaining questions were tailored to each interviewee as their novels explored different themes in diverse ways. As a science journalist, I have also been influenced by a journalistic culture of interviewing. I instinctively applied these approaches to foster a climate of trust. In that context, I made liberal use of follow up questions as new ideas emerged.

Interviews conducted in person were recorded with a Sony IC Recorder ICD-P28, a relatively small and portable device that allows digital storage of several hours of audio data. This information can be easily transferred to a computer and also duplicated as a back up. A small screen on the surface of the recorder device indicates the level of battery power, preventing bad quality sound due to low energy. As an extra measure of safety, spare batteries were carried in all interview sessions.

Interviews lasted between one and two hours (in person) and were conducted in the authors' own homes in London (Carole Cadwalladr, Margaret Drabble and Maggie Gee), in an Edinburgh coffee shop (Simon Mawer) and via e-mail (A.S. Byatt and David Mitchell). All novelists were told that the interviews were for the purposes of a PhD thesis. At the time the interview was set up, I sought permission to record the conversation. This agreement was naturally unnecessary when the interviews were held via e-mail.

Ideally, all interviews should have been done in person. My decision to accept A.S. Byatt's and David Mitchell's conditions brought up two problems. First, the interviewer's ability to ask for clarification or further elaboration is reduced when the conversation is held via e-mail. This means that one of the advantages of the semi-structured interview approach was not fully explored in those cases. Even though I realised the downside of having e-mail interviews, I preferred gathering limited data from these authors to gathering none. Secondly, there is the problem of building trust. While interviewees may feel more comfortable (or perhaps in control) when answering questions remotely, this 'digital shield' raises issues in terms of rapport between interviewer and respondent. Mitchell's and Byatt's answers possibly would have been different had the interview been conducted in person. Nevertheless, I consider the data collected in both interviews consistent in the sense that Byatt and Mitchell wrote what they had in mind in response to relevant research questions.

In this study, different quotation marks will be used to make clear the distinction between interviews conducted in person and via e-mail. The former will have double quotes whilst the latter will be given single quotes (as happens with any written text cited). Similarly, quotations from primary references are cited differently for the sake of simplicity. After transcribing an excerpt of a novel from the corpus, I only provide the number of the page between parentheses. No other details are given. As each analytical chapter deals with a different novel, readers can easily infer what source is being quoted.

### **The novelists interviewed**

The seven novelists interviewed have in common the fact that they have written novels that, in some way, touch on human genetics. Their books reflect, to some extent, the cultural appeal earned by biological sciences. In my mind, scientific accounts of human nature are naturally part of contemporary fiction because they are part of the cultural pool of narratives novelists inhabit.

With one exception (Simon Mawer), all my interviewees have no scientific background. This obviously does not mean that they are not scientifically literate. They consume cultural products containing scientific information and seem to have a critical opinion about what they absorb. They also appear to be very familiar with the current scientific debate, bringing this knowledge to their own frames of reference. This is clear from the ways in which they resourcefully incorporate scientific concepts and ideas in their narratives.

My novelists fictionally explore genetics in varying ways and forms. This explains why each interview was adjusted to the particular case and, as a result, the subthemes explored by my interviewees were enormously diverse. This diversity is also reflected on the content of the analytical chapters themselves. For one, Margaret Drabble, the interview focused on mothers' and daughters' relationships and the anxiety about genetic influence. For another, Simon Mawer, who had written about genetic testing and whether or not reproduction ought to be left to chance, it was the implications of biogenetic control that became my point of interest. For a third, Maggie Gee, the interview was centred on infertility and the divorce between body and mind.

Sebastian Faulks' interview was not considered in the final version of this thesis. His novel *Human Traces* (2006) was selected as it intelligently explores the evolutionary origins of psychosis as a possible scientific account of the human condition. *Human Traces* was written after a four-year research on the dawn of modern psychiatry and, ultimately, on scientific answers to what makes us human. Despite the fact that *Human Traces* is a nineteenth-century historical drama, my hope was to encourage Faulks to discuss his novel in the light of the new genetics. This mission was not accomplished. Faulks' main interest in *Human Traces* is unrelated with contemporary understandings of genes and determinism. His aim was to fictionally portray certain nineteenth-century scientific ideas concerned with the relationship between body and mind. Only tangentially do his explorations touch on contemporary genetics:

“My scientific education consisted in one year of lessons of physics and chemistry. So I didn't have this huge modern understanding of genetics to throw away and start again [when I started to write *Human Traces*]. In a way, I was rather like the characters in the book, starting from beginning” (SF, 179-87)

“I think it is better to go to the main sources when you can . . . So I had to actually find journals of eighteenth, nineteenth, or eighteenth eighties to know. . . . I had to talk a bit about genetics so I wanted ensure a general background to it but I didn't want to read the whole lot of Dawkins because... ah... it would probably be too modern, really.” (SF, 519-38)

Therefore Faulks' interview data, though rich and interesting, would be inconsistent if included in my analysis.

In what follows, I provide some biographic information about each novelist. The interviewees' details are arranged alphabetically. In each case I give the abbreviation that can be used for identifying excerpts in the analytical chapters. A brief summary of this information is provided in Appendix III.

### **A.S. Byatt (ASB)**

**Answered questions via e-mail on the 9<sup>th</sup> December 2009**

A.S. Byatt was born in Sheffield, Yorkshire, in 1936. She is the eldest of the four children of Kathleen Marie Bloor Drabble (a former elementary school teacher) and John Frederick Drabble (a barrister, later a judge). Although A.S. Byatt's parents came from working-class families, Byatt and her sister – the novelist Margaret Drabble – have earned degrees from Cambridge. A.S. Byatt is mostly famous for her novel *Possession: A Romance*, the 1990 Booker Prize winner, and also for a collection of four novels that became informally known as 'The Frederica Quartet'. *A Whistling Woman* (2002) – Byatt's novel analysed in this study – concludes the quartet, which comprises *The Virgin in the Garden* (1978), *Still Life* (1985), and *Babel Tower* (1996). A.S. Byatt has long shown a particular interest in Darwinian ideas in her books. In an essay about the relations of science and fiction in the 1990s, Waugh (2005) identifies Byatt as one of the contemporary British novelists seriously engaging with biological sciences of that decade. Dame Antonia Susan – names for which the letters 'A.S.' stand – lives in London, with her husband of 40 years, Peter Duffy.

### **Carole Cadwalladr (CC)**

**Interviewed on 4<sup>th</sup> November 2009**

Carole Cadwalladr grew up in Wales and currently lives in London. Her professional career started out closely related with tourism: she first worked as a tour guide to American schoolchildren in Europe; then she produced guide books on Prague, Lebanon and the former USSR and eventually became a travel writer for *The Daily Telegraph*. Cadwalladr left this 'secure staff job in journalism' in order to spend nearly two years writing her first novel, *The Family Tree*, which was published in 2005 (Cadwalladr n.d.). The book was shortlisted for the 2006 Commonwealth Writers' Prize, among other awards. It was also a Daily Mail Book Club choice and was dramatised as a five-part serial on BBC Radio 4. Cadwalladr is now a features writer for *The Observer*.

### **Margaret Drabble (MD)**

**Interviewed 14<sup>th</sup> August 2009**

Margaret Drabble was born in Sheffield in 1939. She was educated at Newnham College, in Cambridge, where she read English. Unlike her oldest sister –

A.S. Byatt – Drabble started a successful literary career very early (Duran 2007: 23). Drabble spent the early 1960s writing her first three novels: *A Summer Bird-Cage*, *The Garrick Year* and *The Millstone*. During that period, Drabble was married to the actor Clive Swift, the father of her three children. Motherhood and women's role in contemporary society are prevailing themes in her oeuvre. She has been described by literary critics as a novelist with domestic, middle-class and suburban preoccupations. Margaret and Clive divorced in 1975. In the 1980s, Drabble produced a trilogy where the heroines are not in the centre of the narrative (*The Radiant Way*, *A Natural Curiosity* and *The Gates of Ivory*). She has also edited and revised *The Oxford Companion to English Literature*. *The Peppered Moth* (2000), her fourteenth novel, considered her 'most subversive book' (Mackenzie 2000), is the one analysed in the present study. Margaret Drabble lives in London and Somerset with her husband, the biographer Michael Holroyd.

**Maggie Gee (MG)**

**Interviewed on 21<sup>st</sup> August 2009**

Maggie Gee was born in 1948 in Dorset and educated at state schools and Somerville College, Oxford, where she completed two degrees in English. She was chosen in 1982 as one of Granta's original 'Best of Young British Novelists', alongside names of contemporary British literary scene such as Martin Amis and Kazuo Ishiguro. During the same year, she became Writing Fellow at the University of East Anglia. In 2004, Gee was nominated the first female chair of the Royal Literary Society. Gee has so far published eleven novels, but also anthologies, short stories and a memoir. Gee's novel analysed in this study is *The Ice People*. She has published several science book reviews in *The Telegraph* and regularly taken part in projects or public events that somehow articulate science and arts (e.g. Page 2011). Gee is thus commonly described as a writer whose thinking has been influenced by science (evolutionary biology in particular). The author lives in London with her husband and daughter.

**Simon Mawer (SM)**

**Interviewed on 28<sup>th</sup> July 2009**

Simon Mawer was born in 1948 in England. He was educated in Oxford, where he took a degree in zoology at Brasenose College. Mawer worked as a biology

teacher in different countries (Channel Islands, Scotland, Malta and Italy). His first novel, *Chimera*, was published by Hamish Hamilton in 1989, winning the McKitterick Prize for first novels. *Mendel's Dwarf* (1997) reached the shortlist of ten for the Booker Prize and was selected as a *New York Times* 'Book to Remember' in 1998. In 2006, Mawer published *Gregor Mendel: Planting the Seeds of Genetics* (2006), a non-fiction work commissioned by the Field Museum of Natural History in Chicago. *The Glass Room* (2009), his tenth book, was shortlisted for the Man Booker Prize. *The Girl Who Fell from the Sky* (2012) is his latest book. Mawer has two children and lives with his wife in Italy.

### **David Mitchell (DM)**

#### **Interview via e-mail run from 13<sup>th</sup> September 2009 to 26<sup>th</sup> February 2010**

David Mitchell was born in Southport in 1969 and grew up in Malvern, Worcestershire. He has a BA in English and American Literature and a MA in Comparative Literature, both obtained at the University of Kent. Mitchell has lived many years abroad. He spent one year in Italy (Sicily) and more than eight in Japan (Hiroshima, working as an English teacher, and Hagi). The novelist now lives in Ireland with his Japanese wife and two children. To date, he has published five novels: *Ghostwritten* (1999), *number9dream* (2001), *Cloud Atlas* (2004), *Black Swan Green* (2006) and *The Thousand Autumns of Jacob de Zoet* (2010). In this thesis, I focus solely on the 2004 Booker Prize nominated novel, *Cloud Atlas*, which is a complex web of six narratives.

### **Preparing the analysis**

The four interviews conducted in person were transcribed using Microsoft Word 2010. Due to financial constraints, I did not use a specialist software package such as NUD\*IST. After finishing transcribing, the transcripts were checked for consistency. I read the transcript while playing the audio files and subsequently corrected the errors.

I opted for a full transcription of the interview material as partial transcription would disguise the complexity and subtlety of interviewee's accounts. In addition, full transcriptions would help me to absorb what was being said, allowing new meanings to emerge from the data. Full transcription of interviews is very time-consuming

(Arksey & Knight 1999, Bauer & Gaskell 2000, Bell 2005, Silverman 2006). Whilst authors like Arksey and Knight (1999: 61) estimate that one hour of recorded conversation can take ‘seven to ten hours’ to be fully transcribed, others can be more optimistic. Bell (2005: 164-5) believes ‘you can count on at least four hours work for every hour of interview, even if you are a skilful and quick typist, but significantly more if you are not’. My experience was that it takes much longer: 14 hours of work for every hour of interview. This is probably not unrelated to the fact that I am a non native English speaker.

Transcriptions are never value-free. I decided to edit out pauses, for instance, and such a decision obviously conditions the way the speech is represented. As Arksey and Knight (1999: 141) note, ‘a transcript is one interpretation of the interview, and no more than one interpretation’. In this study, no exhaustive attention was paid to speech modifiers such as pauses and emphases, but hesitations were transcribed. Looking in hindsight, I realise I did not gain much by retaining verbal tics like ‘er’. Today I would have excised hesitations and the like.

A set of codes for analysis were developed during the process of reading the novels that met my research criteria. I started off by reading the novels listed in Appendix I – it was the first reading, and a non-analytical one. When preparing the interviews, I reread the selected novels and took notes based on a set of topics. During that second reading, ideas for coding emerged not only from the literary texts themselves but also from previous reading and literature review. I applied the coding themes used in the novels to the transcription of interviews. Before writing up the final version of this thesis, I read the novels listed in the Appendix II for a third time. In every phase, new ideas emerged while others were refined. In the course of my reflexive reading of the novels and transcripts, I was helped by the notes taken during the course ‘Qualitative Social Research: Interview, Text and Image’ at London School of Economics. Martin Bauer kindly allowed me to join the seminars from 16<sup>th</sup> January to 1<sup>st</sup> May 2009.

The coding process produced four relevant global themes that were addressed both in the novels and in the interviews:

- Personal views of human nature
- Genetic determinism



- ‘Genetic essentialism’ (Nelkin & Lindee 1995)
- Consumption of popular science cultural products

These themes (and the codes they entail) only partially reflect my thoughts at the start of the project. I expected to find the same themes in more than one novel, which in principle would allow me to dedicate one analytical chapter to each theme or subtheme. This was, in fact, the approach adopted in an earlier version of this thesis. The result was unconvincing. After a third reading of the novels, the codes soon developed to take into account new issues emerging from data. It was decided then that each novel/novelist offered representations and discussion of human nature that should be addressed separately in different analytical chapters. These decisions determined the present structure of this thesis.

I want to emphasize that my reading and coding was sometimes an iterative process. When preparing the analysis for the final version of this thesis, I found new codes from both analysis of the novels and interview material. The coding process helped me to reduce the quantity of data to some significant examples. To keep my data manageable, I merged some overlapping codes into a single code.

My analysis produced results that allowed me to construct the argument presented in this thesis. I cannot claim to have discovered new truths about social reality. But I do believe this exploratory study unpicks some questions regarding cultural interactions between science and literary fiction. I also hope that my explorations may enrich future empirical work on the territory where science meets fiction.

## Chapter four

### Margaret Drabble's *The Peppered Moth*

Margaret Drabble published her first novel in 1963, only a decade after the molecular structure of DNA was unveiled. She had then the firm belief that humans were moulded by their experiences and surroundings. She “used to believe that everybody was equally intelligent” (MD, 428-9). She was convinced that you never inherit diseases. But over the last decades Drabble changed her view on human nature. I argue in this chapter that there was not only a shift in Drabble’s perspective regarding the human condition, but also that this change had implications for her writing.

Drabble believes that her change of perspective should be understood “historically” (MD, 43). When she published her earlier novels, in the 1960s, ideas about the human condition were the subject of an intense debate. Midgley (1995) describes this tension as a battle between two camps. One was composed of scientists and ethologists such as Konrad Lorenz, whose ideas were perceived as racist and sexist. They buttressed notions of human behaviour as something biologically determined.

The other camp was formed by ‘left hand’ social scientists who ‘were still insisting that human nature did not exist at all’ (Midgley 1995: xii). Children were regarded at birth as blank canvases, white surfaces waiting to be gradually defined by culture and education. The latter perspective – which, according to Midgley, was also backed by behaviourist psychologists, sociologists, Marxists and educational theorists – was the one Drabble appears to have adopted during the 1960s and 1970s. As she puts it:

“When I was younger and wrote my earlier novels I was convinced that environment was more important than genetic inheritance. And I think it was fashion in the sixties and the seventies to believe that nurture was far more powerful than nature, and that the child was a blank slate and if you adopted a child it would become you rather than the genetic inheritance, but I think that *the scientific discoveries of the last twenty, thirty years,*

*they deeply affected our views of how much we could alter.* It no longer seems a question entirely of willpower, as to what you can change in yourself or whether if you could evolve away from your environment. The force of genetic inheritance didn't seem more of a straight jacket. Now we tend to see our genetic inheritance as much more controlling than we thought it was when I was young. So, in *The Peppered Moth*, that was precisely the question I was exploring. It was: how much you inherit and how much the society alters you and how much is it that you cannot alter." (MD, 43-56, emphasis mine)

Drabble here reveals three important aspects of her views on human nature. First, she shows awareness of the fact that she occupies a specific position in history and culture. In acknowledging a particular historical viewpoint, she concedes that social conceptions of what it means to be human are closely bound up with changes in the scientific, political and cultural landscape.

Secondly, Drabble places the changes enabled by recent scientific discoveries in the complex issue of nature versus nurture. Because of DNA technologies, the writer thinks we now regard humans from a different perspective. As she put it, "they deeply affected our views of how much we could alter" (MD, 49). Monolithic notions of human willpower are somehow undermined because, in Drabble's opinion, scientific studies have shown that some aspects of the human condition depend entirely on genetic inheritance.

Thirdly, Drabble's keen interest in the room left for change in human behaviour has repercussions in her own writing. One expression of this is the question she tried to explore in *The Peppered Moth*: "how much you inherit and how much the society alters you and how much is it that you cannot alter" (MD, 55-6). These questions are in fact addressed in the novel but none of them are fully answered in the plot or through characters' development.

Providing the reader with an open ending may also be seen as a form of avoiding a final message either supporting or attacking genetic determinism. Drabble herself agrees that the narrative closure is undecided:

"Yes, it is undecided. But it depends on what kind of trait or characters that you're talking about. I've been very impressed by some of the genetic

discoveries that have been made by various illnesses, diseases, aberrations, and if you had told me ten years ago that women would be having preventive mastectomies because of breast cancer I wouldn't believe it possible. Because we didn't know. . . . *So our attitude towards what cannot be altered has changed.* But that leaves a whole huge area of things that can be altered by certain things. And *I suppose the novel is about whether what alters is a result of history, a much wider social and historical context, or whether the individuals within that context affect their own destinies. I couldn't answer that,* but is a very interesting big question.” (MD, 60-73, emphasis mine)

Drabble used to believe that diseases could not be inherited. The idea that mutated copies of certain genes, namely the BRCA1 and the BRCA2, could indicate a very high lifetime risk of breast tumours greatly impressed her. Genetic discoveries such as those of BRCA1 and BRCA2 mutations, made in 1995, led her to accept that various illnesses and “aberrations” (MD, 62) are better explained through the workings of biology rather than environment.

The example provided by Drabble is one of the few regarding genes with large effects. It is an exception, not the rule. And the mutated genes are ‘not even deterministic’ as ‘at least 20 per cent of carriers will not get breast cancer’ (Henderson 2008: 72). Nevertheless, it illustrates the point Drabble wants to emphasize: “our attitude towards what cannot be altered has changed”. Since DNA technologies enable early diagnosis and risk assessment of certain diseases, humans have had the possibility to make informed decisions about their future. In other words, gathering information about our “genetic fate” may open routes of action upon that very fate.

Genetic discoveries like the BRCA genes changed the way Drabble used to think about human health. Interestingly, this shift has enough room to accommodate contradictory feelings. Drabble acknowledges that she continues to nurture the fantasy that humans’ positive thinking may keep them safe and healthy:

“I’ve never believed that you inherit diseases. I thought that if you decided you weren't going to have cancer, you wouldn't get it. But I was wrong. But I still partly believe that, because we all have this desire to believe that we are free from the bad bits in our DNA, and we don't want

to be told that we are not.” (MD, 218-22)

What seems to be at stake here is not only the old debate about nature versus nurture but also, and perhaps most importantly, the possibility of obtaining from human bodies information about their past and future. This new information has either explanatory or divinatory power. Humans have then to remap in their minds the areas where they could actively intervene and those that are either inalterable or under the control of chance or history. This new map, as Drabble envisages it, reduces the scope of human willpower but is not necessarily regarded in a negative light. Rather, it is perceived as a new social conception of human nature. It fascinates her for both professional and personal reasons. In addition, as I will show later in this chapter, it also prompts Drabble to use this material to develop and pursue her own fictional agenda.

Drabble believes that science “possibly” made our understanding of human nature less impenetrable precisely because of its explanatory power. She gives as an example her own stammer. Drabble thought it had to do with her upbringing but now she believes her condition emerges from a biological bedrock (see also Drabble 2009a: 122). As she points out:

“I thought it was parental expectation, and I was nervous and wanted to please and... But the research done recently . . . does now suggest that is some neuronal link that doesn’t function quite correctly. . . . I thought they had high expectations but I now think that is more likely to be connected to bits of my speech center which was always a bit odd. I think it’s neurological. And I think in ten years we’ll have the answer because the stammer is incurable, there are ways you can treat it and people can do brilliant exercises, most people can learn to improve it, some never learn. I do think that the cause of that will be discovered and I never used to believe that.” (MD, 1278-90)

In many respects, Drabble interprets the power of DNA technologies as an expansion of human power in terms of altering nature in desirable ways. In other words, genetic research appears as an instrument to alleviate, diagnose or understand diseases, and thus an achievement to which Drabble can feel linked to as someone

who suffers with ailments such as stammer and depression. She believes, for instance, that “[h]uman behavior, or some manifestations of human behavior, is being profoundly enhanced by neurological research” (MD, 1296-7). In Drabble’s perspective, the idea of having the workings of human biology unveiled does not make humans less fascinating. Rather, she thinks that “it gives us more possibilities of shedding some of the impediments that plague [us]” (MD, 1301-2).

Despite her hope for genetic discoveries, she is not too celebratory about them. Although fascinated with genetic research, she appears to be aware of its politics and popular meanings. While Drabble demonstrates awe and optimism regarding some uses of DNA technologies, she does not face the human genome as the blueprint of an individual’s life journey. She is as much interested in what an individual can alter as in what he or she cannot. Drabble also distinguishes, for instance, the influence of genetic inheritance on individuals’ destiny from that on individuals’ physical traits or mental health.

I have shown, up to this point, Drabble’s shift of perspective regarding human nature. The interview with her reveals how she is interested in the way humans, as a consequence of DNA technologies, have built a new relationship around what they see as inalterable and what they regard as changeable. I have suggested that Drabble finds in scientific knowledge convenient explanatory elements that help to justify, or better understand, her own ailments. Now I will move towards the implications of those changes, as Drabble sees them, in her fictional production.

In what follows, I will look at how Drabble resorts to concepts and metaphors drawn from genetics and biology as literary devices to explore human behaviour, nature and inheritance. I will only consider the novel *The Peppered Moth*, which was released eight years before our interview. As I mentioned in my methodology chapter, much of what the novelist said about her motivations and intentions should be understood as narratives reconstructed through time. Even though this could be seen as a limitation, it also constitutes an opportunity for the interviewee to reassess her writing process with the benefit of hindsight.

### **Regarding humans from other perspectives**

We have seen in the earlier section that Drabble’s ideas about the human condition

have changed over the last few decades. In fact, ideas about human nature are historically constructed and, to a certain extent, these perspectives are fluid and shaped by social and scientific developments. Drabble now regards genetic inheritance as “much more controlling” (MD, 53). She credits this change to scientific discoveries that, in her opinion, allowed us to see human beings from other perspectives.

If DNA technologies are really changing the way we see ourselves – or at least have changed the way Drabble regards human nature – then this shift would naturally have implications for a literary genre that depends greatly on representations of humans. In what follows, I examine how these new views of humans are configured in her fiction, namely in the novel *The Peppered Moth*.

*The Peppered Moth* is a novel about the relationship between mothers and daughters. It also taps into the anxiety about genetic influence or, in other words, into the human fear (or eagerness, in some cases) of repeating the same life journeys followed by previous generations. These aspects are of particular importance as *The Peppered Moth* mixes family memoir with fiction.

In the afterword to the novel, Drabble writes: ‘This is a novel about my mother, Kathleen Marie Bloor’ (390). There, she also makes clear that this fictional project was an attempt to get closer to the individual Kathleen Bloor and, in so doing, to acquire a deeper knowledge about her own mother. As Drabble puts it: ‘I wrote this book to try to understand my mother better. I went down into the underworld to look for my mother, but I couldn’t find her. She wasn’t there’ (392).

Drabble describes her mother as ‘a highly intelligent, angry, deeply disappointed and manipulative woman’ (390). Kathleen Bloor suffered from depression, as Drabble does (Drabble 2009b). In her memoir, *The Pattern in the Carpet*, Drabble concedes that the description of her mother’s behaviour was a cruel one. Drabble suggests that, to some extent, the nature of that depressed behaviour lies in her veins too. Nevertheless, it cannot be proved that there is a linear association between depression and genetic inheritance.

‘In *The Peppered Moth* I wrote brutally about my mother’s depression, and I never wish to enter that terrain again. *It is too near, too ready to engulf me as it engulfed her. . . .* I had hoped that writing about her would make me feel better about her. But it didn’t. It made me feel worse.

Both my parents were depressive, though they dealt with this in different ways. . . . My mother could not stop talking. Her telephone calls, during which she complained about him bitterly for hour after hour, seemed never-ending.’ (Drabble 2009a: xv, emphasis mine)

In order to write *The Peppered Moth*, Drabble did ‘family research’ so that she could fictionalize her ‘family background in a novel . . . [that] is in part about genetic inheritance’ (Drabble 2009a: 16, xiii). The novelist explains that she excised any reference to her brother and two sisters (the novelist A.S. Byatt is one of them), but even so Drabble ‘was made conscious of having trespassed’ when she decided to write about their mother’s depression (Drabble 2009a: xiv). A literary critic also suggested that the way characters are devised ‘raises troubling questions about the ethics of exposing her mother yet protecting herself’ (Owen 2001).

In tracing the path of her mother’s nature, the novelist is very much reinterpreting the past but also trying to figure out how much room Kathleen Bloor could have to alter her destiny or behaviour. In our interview, Drabble suggests that the case of her mother’s depression is a “specific example” of how genetics has shed light on our view on human nature (MD, 1259). As she puts it:

“Well, let us take a specific example, which is why my mother was so depressed. Was this biological, was it environmental, was it inherited or was it the result of being on the wrong medication for thirty years? That only occurred to me very recently. She was on the wrong medication and nowadays she could have been on better medication. So, possibly the answer to your question, I can’t remember your question right now, but has this changed our understanding human nature... . . . I think possibly it is.” (MD, 1259-65)

By fictionalising her mother in a novel, Drabble faces a quandary as a novelist: how to make a distinction among depression, personality and environment as determinants of her mother’s character. Drabble’s solution was resorting to metaphors drawn from science: one is the peppered moth (a famous example of natural selection) standing for Drabble’s mother inability to adapt to new environments; the other is the mitochondrial DNA (mtDNA) serving as a literary



device to explore the relationship between mothers and daughters, and also the anxiety about genetic influence that emerges from it. I suggest that both scientific metaphors – not always used accurately – serve Drabble’s literary and personal needs in terms of understanding her own mother’s behaviour. These two metaphors will be examined separately in the following two subsections of this chapter.

### **The mitochondrial DNA metaphor**

Drabble wrote *The Peppered Moth* in an attempt to understand her mother. In adopting mitochondrial DNA (mtDNA) as a leading metaphor, Drabble found a convenient device to explore mothers’ and daughters’ relationship. As the mtDNA stands for the transmission of female behavioural patterns from one generation to another, its use in the narrative allowed Drabble not only to explore the anxiety of the genetic influence but also the axiom that genes determine destiny.

What is mitochondrial DNA? The mitochondrion is an organelle where a source of chemical energy (adenosine triphosphate) is produced in order to supply the cell. That is why mitochondria are commonly described as ‘cellular power plants’. Each mitochondrion has its own DNA and every human cell contains a thousand or more of such organelles – this is what makes it easier to find mtDNA, rather than nuclear DNA, in old degraded samples. Unlike the DNA found in nuclei of cells, which contains information from both parents, almost all mtDNA is inherited from the mother only. It thus acts as a suitable plot device in a story about mothers and daughters.

Female characters in Margaret Drabble’s *The Peppered Moth* fear to reproduce aspects of their mothers’ lives. In the novel, Kathleen Bloor is fictionalised as Bessie Bawtry, the mother of Chrissie and the grandmother of Faro. Chrissie tries as hard as she can to build a life happier than that of her mother, who could not feel happy in her birthplace (a coal mining town in southern Yorkshire) but could not adapt to Cambridge either. ‘Turning into her mother was (and was long to remain) Chrissie’s darkest fear’ (187). What Chrissie saw as a genetic burden lies, more than in the Bawtrys’s failure to escape their hometown, in what happened to Bessie Bawtry *after* she escaped. Bessie fell into a depression and showed ever after a profound inability to adapt to new environments.

‘The Bawtrys had stuck in Hammervale for millennia, mother and daughter, through the long mitochondrial matriarchy. Already Bessie sensed this, and already she feared it. She sensed inertia in the Bawtry marrowbone. Others had shouldered their packs, taken to the road, fled with dark strangers . . . The Bawtrys had stuck here through the ages. Cautious and slow, they had not even crossed the grimy brook. And how should she, a puny sickly child, find the strength to loosen the grip of this hard land, these programmed cells? Yet already she knew that, whatever the cost, she must escape or die.

The structure of DNA had not been discovered when Bessie Bawtry crouched under the table and brooded upon flight and murder. Genes were not then the fashion, as they are now. . . . Bessie Bawtry could not foresee this future, or this past. But under the table her infant molecules yearned and jostled and desired. Or so we may, retrospectively, fancifully, suppose. Something had set her apart, had implanted in her needs and desires beyond her station, beyond her class. Will Dr Hawthorn diagnose and analyse the very gene that provoked her to attempt mutation? And will she succeed in her escape?’ (6-7)

It is suggested that a metaphorical mutation led Bessie Bawtry to want to go beyond her class and escape from the North. In so doing, she would be launching a new pattern of behaviour in her matrilineal lineage. The problem is that Bessie Bawtry succeeds in escaping, but not in adapting to the new environment she is transplanted to. At this point, the mtDNA metaphor and that of the peppered moth overlap: once the background changes, the pale Bessie becomes an easy prey. This aspect will be further explored in the next section of this chapter.

One expression of the anxiety about genetic influence is the horror of having a depressive existence, as if the sense of displacement and melancholy was inherited. ‘Bessie’s loneliness, to Chrissie, seemed deadly. Chrissie, at sixteen, yearned for action’ (192). The narrator of *The Peppered Moth* is often wondering whether Bessie’s children will be able to escape from the biological destiny:

‘Retreat, hysteria, shouting, sulking, abuse. There’d been less of that since

the tablets, but it still could happen, unpredictably, at any time.

Poor Robert and Chrissie, trying to retrace the progress of the disease which was eating up their mother and punishing their father. It stretched back too far for them to know its origins. It stretched back beyond old Ellen Bawtry, who hadn't quite died yet after all. The infection of habit, from generation to generation. Do these two think they can escape? They have been twice transplanted, and more moves are soon to come. Will they be able to take on the colouring of a new environment? Will they succeed where Bessie has failed?' (208)

In every phase of her life, Chrissie is confronted with the possibility of following in her mother's steps. This desire is linked to the ability to move in (and get adapted to) new environments.

During her youth, Chrissie just wanted to escape: '[g]etting away fast and far was her plan' (211). When she chose to study Archaeology in Cambridge, Chrissie felt 'she was rebelling' (212), 'exercising the freedom of the will' and 'breaking with the past by choosing the past' (213). But despite this effort, the workings of inheritance and upbringing seem to condition Chrissie's future: '[s]he went to an ancient university because that's what she was programmed to do. She didn't yet know it, but she was programmed to follow in her parents' footsteps' (213).

As much as Chrissie wants to cut with the past and reinvent herself free from the genealogical burden, she also wants Faro, her daughter, not to break the long chain of matrilineal descent. It is a contradictory response that evokes notions of 'genetic essentialism' (Nelkin & Lindee 1995). Even though the mtDNA is perceived as 'immortal', its 'survival' depends on reproduction. Therefore, Chrissie persuades her daughter to get engaged to Steve: '[i]t is time she found somebody young, healthy and happy, with whom she can perpetuate Bessie and Chrissie's long-lived unbroken mitochondrial DNA' (360-1). Because the mtDNA is almost exclusively transmissible through matrilineal lineage, Chrissie fears that this feminine legacy will get lost if Faro does not have a baby.

Faro is also anxious about genetic inheritance. The character appears to be afraid of her mitochondrial fate or, in other words, afraid of mirroring the lives and bodies of the women of her family. On the other hand, Faro gets very excited about the possibility of tracing back her ancient ancestry. She tries to escape from this sort

of familial fate, but at the same time she is very keen on establishing a connection with the cradle of her female ancestry. She joins a scientific meeting on mitochondrial DNA and local matrilineal descent in a church in South Yorkshire, where she realises that her relatives have graceless bodies. In her view, the genetic legacy is an inescapable burden:

‘Faro notes the obese, waistless, bosom-heavy, thick-jowled, loose-skinned, round-nosed double-chinned and stolid Cudworths, and knows that she is one of them. She has Cudworth-Bawtry blood in her veins and their DNA throughout her structure. She cannot pretend that she has not got a big bust. Is that what she will look like if she lives to be fifty? God, she hopes not. Pity she ate that second egg sandwich. . . . Then she glances, sideways, at stout Auntie Dora with her swollen legs. Quite a genetic battle to be fought, between the Bawtry-Cudworths and the Gauldens. . . . The weight of the flesh, the breeding in the bone. Pity one cannot spring from nowhere, or from fire or wind, like a phoenix or a flower.’ (64-5)

This is what Drabble calls ‘genetic fate’. It is inescapable. In *The Pattern in the Carpet*, Drabble suggests that obesity is in the genes and, therefore, ascribes a singular power to these inert segments of molecules. As Drabble puts it:

‘Most of the Bloor women were slim as children and adolescents; it was in the middle age that their figures thickened, and their waists spread, their bosoms swelled and drooped. I used to look at these women and hope I wouldn’t get like that, but of course it was the genes that did it, not the diet and the lack of exercise. A waistless stoutness lay in wait for all of us. A piggish, balding, bristling yellowish pinkness was our genetic fate.’ (Drabble 2009a: 16)

In terms of life journeys, it is not clear by the end of *The Peppered Moth* whether the habit of inertia or escaping is something handed down from Bessie to the following generations of women. Faro gets engaged to Steven, precisely the man who accidentally discovered a hollow chamber with the Stone Age skeleton resting in it.

This Stone Age individual and Faro share the same genetic material. Serendipity, or ‘fate’, led Faro back to the hometown where her mother, grandmother and even the Stone Age man grew up.

These facts contribute to an “undecided” ending: each generation tries to avoid its ‘genetic’ fate, and actually breaks with repetitive cycles in some aspects, but others seem to come around again as if history was repeating itself. One expression of this is the fact that Faro goes back to Breaseborough in order to find balance and reassurance in her life. Even though readers may find at the end of the book ‘a happy ending’ (392), it remains unclear ‘how much you inherit and how much the society alters you and how much is it that you cannot alter’ (MD, 52-6).

### **The peppered moth metaphor**

Margaret Drabble’s novel was named after one of the most famous (and polemic) examples of natural selection. In soot laden industrial areas of England, where building facades and the vegetation itself became darker due to the pollution, an explosive growth of a population of dark moths took place. The moths whose wings were lighter turned out to be an easy prey compared to the dark ones. Drabble draws on this scientific case study as a metaphor to not only structure her novel, but also to account for her mother’s singular nature.

Inspired by Drabble’s mother, the character Bessie Bawtry is depicted as someone who is detached, always in the wrong place. This failure to adapt may explain her constant unhappiness. In the novel, the character cannot adapt either to one environment or another – and therefore is selected by the background, by any background. Bessie Bawtry’s delicate complexion and intelligence did not match her grim and impoverished hometown. She is represented by the pale moth that became an easy prey in a dirty, industrial area. It is to be expected then, following the metaphor devised by Drabble, that if the pale moth is placed in an intellectual and clean environment it will thrive. But once in Cambridge, Bessie could not adapt to such a sophisticated place either.

This way of depicting her own mother’s nature acts as a possible explanation of why she was so depressed and harsh. In the interview, Drabble describes her mother’s inadequacy by again drawing on the moth’s life cycle, with particular

emphasis on the chrysalis imagery: Kathleen Marie Bloor was “not fulfilling everything she could be, out of the butterfly stage, she has never quite been released” (MD, 503-4).

I mentioned that Drabble suggested that her mother’s unhappiness was possibly related to her depression, and therefore liable to be biochemically explained. In addition, she also wondered if matters of class would have some explanatory power regarding her mother’s behaviour. Drabble ponders if her mother’s inadequacy emerges as a result of a “sense of social inferiority” (MD, 518-9). According to this hypothesis, class would also prevent selection by the background:

“She never found the social background, the social class where she as a peppered moth could fit happily, without people saying: ‘Oh, she’s from Yorkshire’. And I just found that, hum, the story of the peppered moth, like a poetic interpretation of how a background selects you. And when you move from it, you no longer can find your happy place. But she couldn’t be happy there either. Some people are happier there, my aunt was never really happy in the south of England. My mother wasn’t either, but my aunt didn’t even want to be.” (MD, 271-7)

The peppered moth story fascinated Margaret Drabble because, among other reasons, it tapped into the northern roots of her family. The novelist thought of her mother and about how she lacked a sense of belonging to her hometown back in Yorkshire. The image of a dirty and industrialized place as a selective background could be easily transposed into a metaphor of her mother’s sense of inadequacy in an industrial and poor area. As Drabble puts it:

“I was fascinated by it. . . . I just found the interpretation of evolution very interesting. But this very specific one interested me because it seemed to be a metaphor about the way the North of England, the industrial revolution, the dirt and the horror of industrial revolution had caused mutations. It hadn’t caused a mutation; it had allowed the darker version to survive in a darker environment where all the paler ones had died. The dark environment was natural to the dark moth and I suppose I began to ask myself, when my mother had moved out of the industrial background,

as she longed to be, she longed to go and live in a pale beautiful light environment, she hated the dark moth, she hated the dirt, but she never really found another home into which she settled as a natural habitat. She was a displaced person.” (MD, 259-69)

Drabble found in the peppered moth not only a possible fictional explanation for her mother’s unhappiness and depression, but also a running motif that would pull the narrative together. As Drabble explained in an interview, it was ‘actually the discovery of the peppered moth as a link that gave the novel its shape’ (Abbe n.d.). In fact, the peppered moth and its natural history are only clearly mentioned and vaguely explored three-quarters of the way through the novel.

Among scientists, the peppered moth became the most infamous example of natural selection, not exactly in action but rather created by a researcher who tried to prove Darwin’s ideas choosing dubious methods for his experiments. H.B.D. Kettlewell, the researcher, was later accused of carrying out the experiments under highly artificial conditions. In a review of Judith Hooper’s book *An Evolutionary Tale: the untold story of science and the peppered moth*, the science writer Paul Raeburn tells us that Kettlewell chose several unsuitable procedures:

‘Laboratory-bred moths were put on trees in unnatural positions, at the wrong time of the day. Kettlewell himself decided which moths were safely concealed from birds and which were not. He was so adept in the field that even his critics might say he could think like a moth. But nobody believed he could see like a bird.’ (Raeburn 2002)

Although Drabble has carried out research on the peppered moth – the novelist claims to have resorted mainly to popular science books, whose titles she was not able to recall – the peppered moth is not fully explored or explained as a case study in natural selection. The study of the peppered moth is briefly mentioned in the novel by the character Faro Gaulden, a science journalist who read history of science at the University of Waterford, and who ‘was also supposed to be writing a popular book on changing concepts of evolutionary determinism’ (145). In Faro’s account of the peppered moth story, it is clearly stated that she denies determinism as an unavoidable fate: ‘[h]ow could one, asked Faro, believe that everything was genetically or

environmentally determined, and at the same time that all mutation was random?’ (146). Drabble borrows concepts from biology, moulding them in order to make them fit her fictional purposes. In other words, she prefers to adapt the peppered moth metaphor to her literary needs.

Drabble uses the peppered moth metaphor, for instance, as a way of devising an alternative ending for her mother’s life. She imagines the character Bessie Bawtry calmly passing away, finally happy and pacified, in the middle of a much desired sea cruise. In this imagined scene, it is suggested that Bessie, the pale moth, would finally achieve the next stage of a life cycle:

‘Bessie gazed and gazed at the slow and stately image of movement. The heavy vessel cleaved through the dense and heavy water, and she lay in it, warm in a single bed, as in a capsule, as in a chrysalis, a white grub in her girlish white nightdress. She was content. With or without her knowledge, . . . she would sail onwards, away from Breaseborough, away from the smoke and the grime and the slag and the crozzle . . . There would be no more testing and no more failure. She could lie here for ever, suspended, waiting for the next phase. It would come to her. Out there, slowly, it would come to be.’ (313)

In this fictional outcome designed for Kathleen Marie Bloor Drabble uses the peppered moth metaphor not only as a frame to better understand her mother’s behaviour, but also as a form of fantasising a transformation in her mother’s attitude. It also can be interpreted as a way of visualizing a pacified relationship between daughter and mother – Drabble never took Kathleen Bloor on a cruise trip, Chrissie did. As Drabble said in an interview, writing is also a way to redress events you wish had been different (Abbe n.d.). As such, scientific metaphors are also used as a meaningful frame to interpret, and help to deal with, human behaviour and the human condition.

## **Conclusion**

This chapter shows how over the last few decades Margaret Drabble has changed her



view of human nature. She gradually began to regard genetics as having much more control over human behaviour. I demonstrated that there was a shift in the writer's perspective regarding the way she sees the human condition and gave examples of the ways in which the shift had implications for her writing – namely in the novel here analysed, *The Peppered Moth*.

This argument does not mean that Drabble faces human genetics as an inescapable blueprint of one's destiny. She is as much interested in what an individual can change as in what he and she cannot. It is precisely this grey area that Drabble addressed in her novel: how much the society alters you and how much is determined by nature. Her enquiry does not provide answers to the reader by the end of the novel: rather, it leaves them with an open ending. The tension created by these unanswered questions favours, I would argue, a questioning attitude towards current views of human nature.

As Duran notes, Drabble constructs her characters in a way that allows the dramatization of ontological and social problems:

'The worlds portrayed by Drabble are frequently evoked through detailed external description combined with, as has been noted, a sophisticated development of the thought train of protagonist or protagonists. The internal questioning of the main characters – Where will it all end? How did it begin? What does it all mean? – is a staple feature of Drabble's work, and one that stays with the reader, for as she no doubt intends, it reminds him or her of his or her own self-questioning.' (Duran 2007: 24)

In fact, contemporary readers can find in Drabble's imagined worlds 'parallel characters with analogue concerns', for every reader is a human being living in a wide cultural frame. In so doing, I suggest, readers have room to reflect about their own relationship with science and technology.

Drabble is aware of humans' use of narrative as a device for making sense of our lives. It seems a natural consequence of the increasing prevalence of science stories in the media that science narratives become, too, a useful literary device to make sense of the human condition. This does not necessarily mean transposing to literary novels accurate scientific conceptions of human nature. Rather, Drabble borrows biological ideas in order to develop her own fictional agenda. She compares

biological metaphors to human behaviour, which cannot be considered an efficient way to communicate science, yet, on the other hand, she dramatizes questions regarding contemporary views of human nature that are, too, equally important in defining the science we want as a society. After all, as a literary novelist, Drabble is not obliged to use her texts as a medium to convey scientific facts. And we should also not forget that every form of science communication allow the ideas to shift meaning as they are used in different contexts.

## Chapter five

### Maggie Gee's *The Ice People*

In this chapter, I argue that Maggie Gee's understanding of human nature is largely anchored in biology. This perception provides us with a picture of humans as disjointed beings. As a result of social changes and technological advance in Western societies, humans have their ontological experience dismembered: their intellectual heads are somehow broken from the biological body. In Gee's perspective, reconciling both parts is only possible via the acceptance of our condition as animals, as "biological beings" (MG, 464). This idea, as I will show, is fully expressed in her novel *The Ice People*.

While Gee celebrates a view of humanity defined mainly by its biological condition, she presents in the novel *The Ice People* a darker view of humans in the context of their relationship to nature. In that sense, Gee's discourse evokes a portrait of humans haunted by their cultural and technological evolution. Only the primitive, untouched by civilization, is genuine. Gee's perspective, as we shall see, is intimately related with the role of technology and reproduction in contemporary society.

"Biology will always win" (MG, 170), believes Maggie Gee. Her view of humans is largely anchored in our biological condition. Because "we are all biological creatures, human beings", she notes, "we all want love and sex, fear death and love, we all feel hunger" (MG, 33-4). Biology provides her with a window to understand not only humans' basic needs but also human behaviour. Nature is perceived as a powerful entity that rules human lives: "nature has a terrible power like the root of the tongue, and even if the tongue can't speak it never quite escapes the root" (MG, 342-4). Gee's discourse combines a recurrent yearning for the unity of nature with a suspicion about the idea that humans are special creatures.

Gee's perspective is that humans often neglect the warnings of nature, including those emerging from humans' bodies. Women in Western societies, for instance, ignore their biological clocks putting off child rearing. In so doing, they are

disregarding the admonitions of nature and refusing to accept their condition as just animals, “genetic being[s]” (MG, 464). As I shall show later in this chapter, the way Gee contemplates infertility in *The Ice People* explores the role of the reproductive technologies in a social context – and, more interestingly, in a futuristic social context. Consequently, the role of technology in pregnancy and contraception should not be understood separately from the role of science in society. By stressing this I want to say that it is wrong to look at reproductive technologies in Gee’s discourse differently from the way we look at her depictions of organic robots, for instance. Both are examples of products and applications of scientific research as a whole – therefore must be analysed as such.

Gee thinks that “it is very important” that, through our children, our genes will be passed on and, hopefully, we will continue living on Earth.

“To be honest I do think this is very important. Because it is the truth. And I didn’t realise it, I didn’t understand I was a genetic being, a biological being, until I was mid-thirties. I felt like I have made myself up, you know. So, I lived in my head, I had sex with my body, they never got connected, I never thought about babies. And then, very late, I started wanting a baby.” (MG, 463-7)

In Gee’s perspective, having children is part of one’s “genetic being”, even though in contemporary societies this realization is delayed “because for women, clever women, there is a pressure to get on”, because “it is hard to leave your career” (MG, 478-9). Things would be different “if we were less individuated, if we were pre-industrial, if we were pre-contraception” (MG, 487-8). And as contemporary societies have long ceased to be “pre-industrial” and “pre-contraception”, women are destined to a disjointed existence, at least until they realize they are “genetic beings”. They live in their heads and have sex with their bodies until the moment they embrace an ‘animal life’. Until then, head and body “never got connected”.

I argue that Gee’s discourse bears a perspective of humans haunted by their cultural and technological evolution. In other words, it suggests that authenticity lies in what is primitive, untouched by civilizational change. This naturalistic view of human beings seems to disregard the fact that humans cannot exist outside culture. It is true that the advent of the pill implies a biological change in human behaviour –

sexual experience easily dissociated from procreation, for instance. But it is not less true that the pill should be seen as a phenomenon whose implications involve as much cultural as biological dimensions. As even Dawkins (2006: xiv) points out: '[o]ur brains have evolved to the point where we are capable of rebelling against our selfish genes. The fact that we can do so is made so obvious by our use of contraceptives'. But Gee's response to her own personal experience suggests that, to her mind, selfish genes enjoy a hegemonic status over human reason.

Gee also believes that the desire to get pregnant is a biological message. As being part of "the first generation with contraception", the novelist experienced a sudden motherly desire despite the fact that she was on the pill and not planning to get pregnant (MG, 489). Contraceptives, according to Gee, were provoking recurrent dreams about fragile babies being dropped. She interpreted these dreams as the body, once silenced by synthetic hormones, communicating with the brain.

"I wanted to tell you about something that happened to me that I didn't understand, at the time. When I was in my twenties, when I started on the pill, I started having repetitive dreams, and these dreams were that I had a tiny baby, and I kept leaving it somewhere or dropping it, or loosing it, on the table and it would roll off the table and I would just... Very small, tiny! I couldn't understand these dreams, they were almost comic. And then I told them to a friend of mine, also my age, also on the pill, and she was having the same dreams. And then she told it to a friend of hers and she was having the same dreams. *In our dreams, the pill was preventing implantation, so probably the dream was a communication between the body and the brain.* . . . But it was very interesting, a whole generation, maybe, having that dream." (MG, 508-19, emphasis mine)

These dreams are perceived as "a communication between the body and the brain", standing for the desire of women's ageing bodies to get pregnant. It is interesting to note how Gee's accounts of the human body endow it with agency and personhood. According to Gee, in the context above, dreams are a purposeful biological manifestation clearly marshalled by natural forces: "I think it was biology . . . In my case I have to think it was straight biology" (MG, 532-3). She sees these dreams as an attempt to restore the natural order disturbed by human or scientific intervention.

Gee's concerns about how human nature has changed over time, and also how human history has transformed it, does not mean that she is against contraceptives. "I'm not against contraception, of course I'm not" (MG, 491-2). The development of the first oral contraceptive, *per se*, is not regarded in a negative light. In trying to elaborate on the reasons why "body" and "head" got divorced over reproduction, Gee suggests that the change probably derived from the transformation of the role of women in society and the composition of the workforce.

"Later we became friends with the inventor of the pill, Carl Djerassi. He doesn't like these stories [about dreams]. I told him these things, he won't accept. But, I mean, there was a down side to it all. He must feel... He can't feel any responsibility for the dropping of the birth rate, for example. But it's very significant the drop of the birth rate, not just because of the pill. Also because of women working and... But I think it was not only because of the pill... There was a big drop [in the birth rate] in Catholic countries too. And it was not only because of the pill. That's supposed to be all because of women working." (MG, 508-26)

Gee's perspective about the effects of cultural and technological evolution on human reproduction unveils a vision of humans disjointed by social, scientific and technological changes. This cleavage has been disconnecting women's bodies from their consciousness, re-enacting very old tensions between mind and matter, culture and nature. Gee's particular view on the subject is that of the hegemony of biology over culture. As the novelist pointed out in an e-mail conversation, '[o]ur minds seem to have such a rigid power but they are powerless when the body speaks' (Gee 2009).

### **Maggie Gee's 'animal life'**

The connection between body and mind (or the lack of it) is also addressed in Maggie Gee's autobiography. It is entitled *My Animal Life* (2010) and, on the cover, it shows a picture of the novelist, surrounded by coloured drawings of wild animals and plants. In this memoir, Gee shares with the reader not only the joy of our 'animal luck', but also how she was taught the hard way to listen to her 'animal body'. Gee's

progressive realization of her existence as an ‘animal life’ is also deeply connected to fertility issues. As Gee (2010: 53-4) puts it:

‘I was very slow to find a way of thinking not wholly centred in my own species. But perhaps I wasn’t as slow as all that because many people cannot bear to sustain the loss of pride involved in knowing we are ‘just animals’.

When did I start to see it was true? I think I was probably around forty. My body, which I loved, had failed me by beginning on a series of miscarriages. I saw my will and my hope, both unlimited, were tethered to my mortal, animal body. ‘Today’s women want it all’, crowed the magazines of the ’80s and 90s, though the claim had already begun to sound hollow, ‘you can have it all, you can have it now’. The siren song was a lie, of course. Because only a very few, very lucky, women have more than one child after forty.

. . . Biology is unmoved by our rights, unaffected by women’s changing hopes and dreams. My eggs had been ageing like any chimpanzee’s while I followed my glad little human trajectory of ambition, and getting what I wanted, then the belated realisation that I longed for something outside myself. We wanted a baby. No, we wanted two babies. . . .

*You never understood. You left it too late. You aren’t special, you’re an animal.’*

From the passage above, we infer that Gee’s allusion to the continuity of the animal and human worlds sits largely on the body and its limitations. It is only when Gee discovers herself as a body in time – therefore, mortal – that she understood her existence as an ‘animal life’. Here, ‘animal’ appears to stand for the materiality of human life. Her purpose is not to depict humans as beasts or animals as humane creatures (i.e. moral entities); or even to engage in the intense social and scientific debate about the boundaries between other animals, human groups and hominid species. Rather, Gee draws on the idea of being part of a great animal continuum as a model of explanation to her personal and professional journey.

Much of what Gee refers to as ‘animal’ in that quotation could be effortlessly described as simply physical or biological. Throughout *My Animal Life*, bodily

activities that do not involve strong intellectual exercise are often described in Gee's discourse as 'animal'. While breastfeeding her daughter, Gee experiences what she describes as an 'animal bliss' (2010: 83). The joy of running is part of our 'animal luck' – unlike plants, we are not attached to the soil. Climbing, running and playing in the open air are also cited as part of the 'animal life' every child needs. According to Gee's perspective, then, humans' acceptance of an 'animal life' involves in fact just one's acceptance, or higher awareness, of the fact that we live within (and are ruled by) a physical body.

Gee's words address the body as a separate terrain in the human realm, a terrain which is ruled by 'animal' forces. Her initial preoccupation is to reconcile these isolated feuds within the same realm:

'Why call this book *My Animal Life*? Not to degrade my life, but to celebrate it . . . To link, in a way I only learned to do in my thirties, my mental life to the body I love and enjoy' (Gee 2010: 13).

But what she eventually suggests is that, ultimately, we have to accept that our minds are powerless when the body decides to speak. We are ruled by our bodies – after all, as we have seen, Gee sees humans as "genetic beings". This perspective is not entirely new in Gee's discourse. A decade before her autobiography, Gee wrote in a text about what it means to be human:

'We seem to be losing contact with the physical body. Though we are always being told that we share 99% of our genetic material with chimpanzees, we treat it as one amazing statistic rather than a simple fact. 'You are an animal' is still a term of abuse. We are indignant about ageing, astonished with terminal diseases. . . . *But the abandoned, neglected flesh can still revenge on the minds which believe themselves autonomous.* Women in their forties are grief-stricken when they find it is not easy to have babies as the tabloids promised.' (Gee in Malik 2001b: 30, emphasis mine)

The problem with this vision of humans is that, in the light of contemporary knowledge developed in neurosciences, it implies a divorce of elements of human



nature that are inseparable. The concept of the ‘embodied mind’, as Damasio (2005: 252) advanced it in *Descartes’ Error*, argues that ‘the comprehensive understanding of the human mind requires an organismic perspective’. In other words, humans, endowed with evolved brains, think *with* (and not *despite*) their bodies. Curiously enough, Gee accuses neuroscientists (or science writers interested in neuroscience) of exactly the opposite. In a response to Malik’s essay on what science cannot say about human nature, Maggie Gee claimed that the emphasis on the mind is disconnecting our society from the physical body:

‘Kenan Malik is far from alone in dismissing our animal selves and seeing ‘consciousness and rationality’ as ‘inseparable twins’. At the end of *The Private Life of the Brain*, Susan Greenfield says that she has increasingly begun to see ‘mind’ and ‘Self’ as ‘synonymous’ (though one of the engaging features of the book is the occasional eruption into the text of a fun-loving physical self which enjoys ‘the sudden taste of burgundy, the orgasm, or the unexpected thrill of the ski-run.’) Susan Blackmore concludes her book *The Meme Machine* by questioning the existence of the individual self . . . as if selves did not have physical boundaries of a vary basic kind – our bodies.’ (Gee in Malik 2001b: 29-30)

Gee uses scientific ideas as a model for making sense of her personal life. This mechanism is also adopted in her literary career. In the same response to Malik, she argues that one of her preoccupations, when writing fiction, is ‘to go beyond individual characters and say something about human beings as a species’ (Gee in Malik 2001b: 29). Gee claims that what she finds most fascinating in contemporary biology is the assumption that humans are cultural as well as genetic creatures. But what we detect in her discourse is mainly an emphasis on the biological rather than the cultural.

Darwinism provides Gee with a way to better interpret the competitive literary world where she moves. Even though the notion of Darwinism applied to society is definitely not new, hers is specifically modelled by Dawkins’s memetics and its subsequent review by Susan Blakemore (1999) in *The Meme Machine*. It is interesting to note the parallel Gee establishes between reproductive fitness and literary production.

“. . . both are also about copying. Success is copying. A child is copying. They both grow through evolution struggle. In the market place, in one case, number of copies produced. Your children, if they have children, how many grandchildren, how many more. They are very similar, I do think, but the truth is for women they very often work against each other.

. . .

The literary world is just like Darwinian struggle, just like Darwinian evolution. So much of it is about chance, so much is about the environment of the time, and so much of it is about whether you build a cohort to help you through. It's very similar, very similar.” (MG, 844)

In her autobiography, she again explores this parallel: ‘I started to put my observations of the literary world with my reading on evolutionary biology; life is a struggle’ (Gee 2010: 191).

Gee displays publicly her interest in evolutionary biology as well as the influence of this discipline in her work (Paton 1999). Her personal understanding of genetics seems to be closely related with human's instincts, social behaviour and the notion of kinship. The author has read many popular science books and credits to such readings the way she sees the world. Gee read Richard Dawkins's *The Selfish Gene* in the 1970s, for instance, and “thought it was brilliant” (MG, 811). “It nearly changed the way I thought about things”, Gee points out (MG, 811).

In recent years she has been interested in William Hamilton's texts on evolutionary biology. Gee has also written a short story entitled ‘Living With Insects’ (Page 2011: 211-25) that was inspired by Hamilton's formulation of ‘inclusive fitness’.<sup>13</sup> In this commissioned text, we find a particular preoccupation with conveying scientific facts. This purpose is absent from *The Ice People* but this should not be interpreted as a flaw. Novels are not expected to provide extensive learning experiences; they are media products created for entertainment purposes (Turney

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<sup>13</sup> In two papers published in 1964, Hamilton provided a theoretical basis for understanding ‘inclusive fitness’. They supported the idea that genes are the replicating currency of natural selection – and not organisms – by measuring the success of an individual in terms of the survival of itself and of its relatives. For example: social insects help their sisters to breed so that they can leave more copies of their genes in the next generation than trying to breed themselves. Through the lens of inclusive fitness, such behaviour can be interpreted as genetic selfishness rather than altruism.

2009).

In the next section, we shall see how *The Ice People* offers an opportunity to project current time and space onto imagined universes and, thereby, to create a hypothesis about the impact of science and technology in society. The novel portrays a bleak world where infertility is the price to pay for technological progress. In what follows, I explore the role of reproductive technologies and organic robots in the narrative. I argue that both are intimately related given that electronic pets are presented as a substitute for children.

### **Technology and infertility in *The Ice People***

Up to this point, I have explored Gee's view of humans as disjointed beings, with their heads disconnected from their bodies. This notion implies that humans are disjointed because they are not paying proper attention to their true, 'animal' essence. We have seen also how Gee's discourse embraces a view of humans haunted by cultural and technological evolution. This assumption is based on the idea that human nature has become less 'natural'. Because Western societies are today less dominated by nature, and more shaped by culture, humans are forgetting that they are after all "genetic beings". *The Ice People* is partly about the consequences of this scenario projected onto the future.

The arguments above reflect Gee's double-edged position about science: while Gee calls on the authority of nature, encouraged by her readings on evolutionary biology and gene-centred scientific disciplines, she worries about the consequences of science's attempts to control nature. To further explore Gee's ambivalent attitude, I shall look now at the reproductive technologies and the mutant child-like robots described in *The Ice People*.

The occurrence of a new ice age has been widely imagined by writers and film directors. Maggie Gee's novel *The Ice People* (1998) is another contribution to that catalogue of freezing dystopian scenarios. The initial thought for that novel was found in a book published by the science writer Adrian Berry in 1996: "the idea came from one of those books I reviewed for *The Telegraph*, it was called *The Next 500 Years*" (MG, 834-5). Despite the fact that climate change was the starting point of the book, Gee's concern in *The Ice People* lies less in the cold landscape than in the central

themes of her literary oeuvre: family, race, gender and biology. I begin by looking at the ways in which Gee explores the themes of reproduction and infertility in the novel.

We have seen that Gee's perception of technological progress and civilization's decay is intimately related to her disjointed view of humans: the difficulty of combining an idea of humans as natural beings with an understanding of humans as rational agents endowed with evolved brains. These conflicting portraits of the human are also present in the novel *The Ice People*. In the narrative, men and women start living apart mainly as a result of social changes and technological advances – as they get busier and more and more dependent on technology, fertility rates decrease dramatically. Without reproduction, co-habitation ceases to have a meaningful purpose in society. Therefore, in *The Ice People*, fertility is deeply related with humans' ability to change and reinvent the social and natural landscape.

Gee's strategy to introduce sharp dichotomies between men and women in *The Ice People* works mainly around their impossibility to conceive. And so work the dichotomies between what is perceived as genuine and, in opposition, what is regarded as a product of human, scientific or technological intervention. Her argument stems from the idea that it is procreation what keeps sexes together (Paton 1999). Imagining a future in which humanity has gone infertile means, then, also exploring the phenomenon of gender segregation. This scenario includes the creation of child-like organic robots, which are presented not only as technological gadgets that seduce male consumers, but also as children substitutes. They also express Gee's concern about the predominance of control over nature in scientific attitudes.

Precisely because for Gee “[w]riting about the future is about saturating our present”, close attention must be paid to her representations of how humanity lives and engages with scientific applications in a near future (MG, 904-5). These depictions give us insights about the ways in which humanity is perceived today, and also about the fears and anxieties that permeate such views. As Gee puts it, “it's a political tool to understand the present through exaggeration and projection” (MG, 905-6). It is also an attempt to observe contemporary ethical and moral issues within a frame different from that of the present, as the novelist points out:

“It's a way of exploring ethical and moral issues without the model of the present. You can sort of clarify it by taking things out of context and

looking at them in this new arena. Of course it is an exaggeration but I was trying to write about separation of genders” (MG, 910-3)

But what are exactly the exaggerations of the present that we can find in *The Ice People*? Humans are largely infertile, nearly all babies are produced on demand in techno-clinics (‘techfix births’) and the child-like robot companions represent a threat after the occurrence of a dread mutation. These child-like robots, called Doves, are specially appreciated by men, who appear to relate to them as replacement for children they cannot have. Those who, like Saul, have the chance to become a father tend to fight desperately for the custody of their children. Men like Saul do that, as he realizes by the end of the novel, not because a father is ‘a hero, or a villain – but [because a parent is] merely one tiny unit of biology, stopping at nothing to save his genes’ (208). Those exaggerations demonstrate how these three elements – infertility, reproductive techniques and child-like organic robots – gravitate around the same crucial theme: reproductive fitness.

It is not completely clear in the novel what scientific explanations underlie infertility in *The Ice People*. Saul believes that ‘[s]tress *can* make human beings infertile’, implying that Sarah’s ‘successful’ career may be rendering her not only ‘always hyperactive’ and ‘always exhausted’ but also sterile (30). ‘Sarah’s wristphone’, for instance, ‘never stopped ringing’ (30). The pace of their lives is described as a sort of hindrance to a natural conception. They ‘worked into early hours’ and ‘lived symbiotically with . . . machines, which responded to . . . voices, of course, opening doors, cooling, heating, dealing with rubbish, ordering food’ (30). Their lives ‘were flying high’ except for the fact that they ‘had another life that was a secret minefield of rings on calendars, hopes and fears’ (31).

Gee’s description of Sarah’s misery after every period makes us think about Nelkin and Lindee’s observation that childless or infertile couples are regarded as incomplete because they do not have a ‘real family’, a ‘molecular family’. Nelkin and Lindee (1995: 60) define ‘the molecular family’ as a notion ‘based on the cultural expectation that a biological entity can determine emotional connections and social bonds’. In that sense, genetics is perceived as a reliable and ‘natural’ connection between people, linking them regardless of the constraints of time and space. Those who fail to produce this genetic link towards the future are doomed to a sense of unfulfillment and incompleteness. Women in that condition are described by Nelkin

and Lindee as liable to hear their biological clocks ticking because their bodies, as if endowed with agency, ‘want’ to get pregnant. When women do not trust their instincts, it may become too late. This perspective is also represented in *The Ice People*:

‘The first time we did it, she said, insanely, “Come on, Saul. Let’s make a baby. I know I’ll get pregnant. I just feel it.” . . .

“But if we want to travel, Sarah,” I said. “You thought, in a year... once you’re established in the job. We talked about going to the ends of the earth...” I felt as if our dream might slip away, but perhaps I was looking in the wrong direction. . . .

Regret hit me like the back of a spade. I knew I should have trusted her instincts, and we would have made a baby at once, a bouncing, beautiful, healthy baby...’ (21)

Since couples have gone infertile, babies in *The Ice People* are produced in expensive fertility clinics from where signs of hope and anxiety emerge: ‘chilling . . . investigative pieces on rates of deformity in techfix births’ and ‘disquieting stories’ about ‘mixups of sperm or eggs or foetuses’ (35). The alternative to natural conception is reproductive technologies that, by interfering with what is perceived as the genuine state of affairs, are not only liable to produce unhealthy babies but also highly commercially explored by successful doctors-entrepreneurs. During the period in which Sarah has undergone treatment, she started to have disturbing dreams about child deformities. As described in *The Ice People*:

‘She dreamed she had children who sprouted wings, poor thin things with bodies of griffins, and as she tried to take them out in the sun she found they were kept alive by tubes, and when she tried to free them, they died. This dream returned night after night.’ (35)

Despite those fears, Sarah and Saul decided to rely on the ‘techfix birth’ reproductive method and, finding in it solace for their parental desire, Saul enjoyed thinking ‘that men were still in command of things, masters of a friendly universe’ (35). However, the world he is about to offer to his son – Luke, born with intestinal

problems from a twin pregnancy that went partly wrong – is on the verge of decay and chaos. These elements of disintegration stem largely, it is suggested, from social changes and technological advancements. Saul, a former nanotechnologist specialised in artificial intelligence, acknowledges in his epic narrative that human hubris and ambition helped to take the planet to such a dead-end.

While infertility is presented as a price to pay for that busy and technologically advanced lifestyle, it is also suggested in *The Ice People* those who lead lives in harmony with nature do not have fertility problems. While Saul recalls his past, a period when he ‘was besotted with our cleverness’ (13) and was an apologist for the extreme power of humans over nature, he describes a story he has read on the tube:

‘The underground trains were back in service, after more than a year of being sealed off. I tubed in, reading a weird story about some people in Portugal living in caves. They said there were hundreds, maybe thousands of them, living as people did in the Stone Age. And they were breeding. There were children everywhere. They looked dark, in the picture, with sparkly eyes. The newstext demanded to know their secret. I thought how much I’d like to go and see for myself. . . . It made me think with longing of Euro. Mountains. Plains. I should be free... What kind of life did they live, in the caves?’ (13-4)

In many ways, wilderness appears here associated with the idea of fertility. As such, what is perceived as primitive does not violate the natural state of affairs. Perhaps because Saul – a character narrating his journey in hindsight – regards his model of civilisation and progress with a sense of failure, what he perceives as primitive gets folded into ideas of authenticity.

The idea of primitiveness is cast in a positive light in *The Ice People*. When he was young, Saul lived with Sara ‘in a box of a room’ (20), when the world was still facing the global warming that preceded the new Ice Age. They used to get along then, they were not wealthy but they are described as a happy couple. As Saul recalls it: ‘We were grateful for our sweaty box, though it was on the third floor and had no aircon, no voice response, no autoservice. *It was primitive, but so were we*’ (20, emphasis mine). They imagined their near future lives far away from London, they

‘dreamed of making for the last open spaces’ because they ‘imagined raising a family by the sea, with forests, fields, clean bright water’ (21).

In *The Ice People*, human civilization is facing the end of an era, driven by irresponsible behaviour and human presumption, but this is not necessarily an apocalyptic scenario for humankind. There are ‘native’ communities delivering healthy babies (‘These animals had babies, and we could not. How on earth would they look after them?’, 220) and this contradicts signs of the irreversible destruction of humankind. Children living in an idle airport are described as animals, barely able to fluently speak or read. They are in charge now and they keep Saul alive only because they benefit from his storytelling and ability to repair decrepit Doves (humanoids created to join families as pets or children). These organic robots are the remnants of the former social structure, dominated by technology and gender segregation. Human civilization as we know it reaches its final chapter, but the possibility for humankind to start again free from the technological burden is left open.

### **Human hubris: “We are too clever, which makes us stupid”**

We have seen in this chapter that depictions of humans controlling nature, which are in the centre of a humanist tradition and of much scientific practice, appear in Gee’s discourse not in a laudatory manner but almost in an embarrassed one. Thanks to our evolved brains and unique cleverness, humans exert tyranny over the rest of nature. In the novel *The Ice People*, a dystopian image of our planet in a near future is presented. In this fictional account, we can see Europe devastated by climate change, gender wars and mutant child-like robots. This idea of humans is a pessimistic one.

This chapter also shows the ways in which a yearning for the unity of nature, the idea of human beings as part of the great organic whole, is clear in Saul’s narration. This is the discourse of an old man, who has learned lessons the hard way. The young Saul, as the old Saul reminds him, represents the presumption of humankind regarding the control over nature:

‘Human beings have always foretold the future. Self-deluders. Wishful thinkers. I used to do it all the time, obscenely self-confident, a



technoteacher... I told my pupils about global warming. I told them why we were so hot, why despite all our efforts it could only get hotter'. (4)

In the novel, nature is represented as an entity which always holds the final answer. When global warming was considered an inevitable prediction, an overwhelming ice age arrives, forcing humankind to change their lifestyle. When humans believe they can control reproduction, problems with infertility start to get worse and contribute to social decay. When the boundary between the living and the nonliving gets blurred, organic robots rebel against their creators and render them to meat. What we find here is always the same message: do not tamper with nature, otherwise it will fight back.

The Doves are one expression of the idea of humans paying the price for their extreme inventiveness. A new version of the robots allows them to be fed with organic waste. In principle, this would be a cheap and convenient way of eliminating domestic litter and fuelling the machines. Nevertheless, an unexpected mutation will produce a deviancy in Doves, leading them to attack humans. Gee created this aspect of the plot drawing on the imagery of men eating themselves via the application of their own knowledge and expertise. In other words, Doves are the price to pay for tampering with the minimal units of living things and mingling them with inorganic particles. As Gee points out:

“Because our brains, our brains are out of control really. We are too clever, which makes us stupid. And this is possible, I think, we know that only recently in the papers, there have been some scientists talking about it and worried about artificial life if taken on its own. . . . In a sense it is tragic because we are making ourselves extinct potentially.” (MG, 674-81)

Even though Gee nurtures “a kind of activist loyalty to carbon life” (MG, 680), she understood that Doves should be set free because they were created to be controlled. In addition, robot inventors could not see “that life is more resourceful” and, therefore, it can undergo unexpected mutations. Her concerns with the creation of life in a laboratory stem from two basic ideas: first, humans’ attempt to create life is regarded as a form of playing God, and this transgression will be punished somehow; and secondly, considering the idea that all aspects of life are to be understood in the light of natural selection, it is thought to be inadequate to produce organisms whose

genetic make up could not be tested from an evolutionary viewpoint. As Gee explains:

“. . . we're creating, we are trying to create life and a little bit of me, you know, unconsciously, thinks: this is not for us, this is for gods. But, you know, I'm just wondering, because to me there is a sense of original sin in it, a sense of sin about. . . . Creating life in the laboratory. . . . For those who think. . . 'Why shouldn't we?' I say, the problem is: other lives were tested by, tested by, tested by the evolutionary process over a very long time. I also fear a kind of life that is controlled by a human being, in other words, a human inventor. I feel there is something terrible about creating life and trying to control it, utterly. You know, that is the programme. When you have children you can't control them, something can happen that is pretty and it's not what you expected. So I suppose a part of me is trying to set the robot free, even though they could attack us, you know what I mean? . . . There's ambivalence there too.” (MG, 726-46)

The dystopian scenario presented in *Ice People* seems to be a warning against the notion that nature exists for humankind to exploit it, or even an admonition of the notion that material or technological progress inevitably entails moral progress. For Gee, the hindrances of modern life rest in the hubris of human cleverness. Gee's discourse does not encourage the idea of humans as exceptional beings, occupying a special status in nature. The denial of this human distinctiveness appears to have roots not in scientific practice itself, as Malik (2001a) notes, but in the philosophical pessimism about the meaning of humanness. Gee thinks that the exaltation of human exceptionalism has led us to historical mistakes such as the horrors of the Second World War. As the novelist puts it in a response to Malik's argument:

“. . . it surprises me that Kenan Malik so confidently diagnoses the decline of Enlightenment optimism and a 'retreat' from can-do spirit of 'human exceptionalism'. I would have thought there is rather a lot of self-confidence and optimism in the world today. *The Cyborg Manifesto*<sup>14</sup> is

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<sup>14</sup> 'A cyborg manifesto: Science, technology, and socialist-feminism in the late twentieth century' is an essay written by Donna Haraway in 1985. In this seminal text, Haraway uses the image and the myth of the cyborg to challenge feminists to construct a new relationship with politics, one that is beyond

not serious science but the Human Genome Project is: what could be more optimistic than last year's triumphal fanfares over its 'completion'? (as it turned out, only half-completion)? . . . The fact is, some scientific optimism wears badly. No one now would recommend radiation as a cure-all for everything from a cold to sexual dysfunction. Nor do we have positive memories of large-scale political optimism: Stalin's Russia, Hitler's Germany, Mussolini's Italy, Franco's Spain, Mao Zedong's China, all believed fervently in the transforming powers of the human will.

. . .

What is it to be human? I agree with Malik that it is to try to understand and improve our lives. But it is also to laugh, to deflate, to fail, to love, to feel time and the sensory world pressing against our skin. To be human is to take our brief place in a line of living and dying bodies that stretches back across three and a half thousand, thousand millennia.' (Gee in Malik 2001b:30).

Underlying Gee's pessimism about the ways in which human intelligence has controlled and transformed nature – including human reproductive process – a step back from the main ideas at the heart of humanism can be identified. Both in Gee's discourse and the novel, human beings are perceived as exceptional not because of their unique capacities but rather due to their 'animal lives'. This position is understandable considering that, historically, enthusiasm about human perfectibility derived largely from the confidence both in continuing social advancement and in the power of human reason. As the Darwinian anthropologist Robert Foley notes, during the course of the twentieth century it is difficult to sustain the image of humans on a pedestal above an alleged animal brutishness:

'The camps of Dachau and Belsen, the millions killed in religious wars, the extent of poverty, famine and disease, and the almost boundless capacity of humans to do damage to each other at national and personal levels have, in the twentieth century, rather dented human self-esteem.'

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naturalism and essentialism. In questioning the boundaries separating 'human' from 'animal' and 'human' from 'machine', she puts forward the argument that the cyborg myth can take society beyond the dualisms that frame what is human and non-human in the Western tradition.

(Foley 1996: 39)

Since pessimism dominates the zeitgeist, little motivation is left to strengthen a vision of humans as special *because* they have the capability to act upon nature.

Although Gee gestures towards neo-Darwinian notions about human nature, she is uneasy with the idea of entirely locating human morality in nature. As we can read in her critical review of *How the Mind Works* published on *The Telegraph*:

‘Uncomfortable questions linger in the reader’s mind after Pinker’s strenuous gymnastic session is over. Although he briskly advocates keeping the ethical and genetic spheres apart, what meaning remains to goodness, kindness and unselfishness if all human behaviour is really concealed genetic self-interest? How do we explain Mother Teresa, or homosexual love? Is the artist’s belief that creating beauty is an end in itself an inexplicable delusion? Are religion and ethics more, or less, necessary because their teachings warn against selfishness? Is crime more forgivable because it is rational?

Perhaps the conclusions of evolutionary psychologists, however cogent, should not be urged upon depressed people, criminals, the impressionable young - or politicians.’ (Gee 1998)

Gee may argue that biology always wins, that our minds are wordless when our body decides to speak and that we should accept ourselves as ‘genetic beings’. But when an evolutionary psychologist like Steven Pinker bluntly claims that all human behaviour conceals genetic interest, Gee shows a critical reaction. She seems to be particularly distressed by the idea that love and art are just human social practices that helped our genes surviving natural selection. Regarding these examples, she is not prepared to accept that biology always wins. This shows how novelists creatively and critically edit and adapt the scientific ideas they draw on. Specifically in the case of Gee, it is interesting to note how she makes sense of human life through neo-Darwinian ideas but always accommodating this legacy within the frame of her personal beliefs and literary needs. One expression of this is her pessimism about human nature in a time when evolutionary psychologists enthusiastically try to prove that violence is decreasing (Pinker 2011) and that the past has always been worst than the present

(Ridley 2011).

## Conclusion

Maggie Gee wants to see humans through the lens of biology. Her perspective is that of humans as ‘genetic beings’. Here, as in any situation, the line to be drawn between man and other animals is shaped by the individual’s perception of what it means to be human. As individuals, novelists establish this boundary according to their beliefs and literary needs. In that sense, Gee’s beliefs about humans as essentially biological creatures derive less from problems of evolutionary biology – to which the novelist has access from popular science books and public events – than from her personal experiences and views of humans’ place in the planet. Gee is not concerned with conveying facts about science in her novel, but it is through scientific knowledge that she tries to make sense of human life. In so doing, I argue, Gee is indeed playing a role in the science communication arena.

Humans’ place on the surface of Earth can be permeated by hubris or humbleness; it depends on the human aspect Gee wants to focus on. When humans humbly accept their biological lives, they cease to be disjointed beings. They can be in tune with nature; they have their heads connected to their bodies. Conversely, human hubris stems from activities in which individuals, using their evolved brains, attempt to understand, control or transform nature. These dichotomies are well-known in the field we are discussing here – but in Gee they appear interestingly explored within the frame of women’s fertility and reproduction. No wonder then that, in *The Ice People*, the risk of technology going out of control occurs precisely when reproduction ceases to be a privilege of carbon-based life.

The pessimism surrounding contemporary views of the human is politically motivated, but it is also connected with the popular perception science has received since the Second World War. Fears about nuclear testing and environmental disruptions played an important role in this pessimistic response. In *The Ice People* this is represented not only by human infertility but also by artificial life going out of control. Gee’s portrait of human exceptionalism falling from grace reflects an obvious continuity of that pessimism about science. However, most importantly, it reveals an ironic contradiction of these days: Gee is suspicious about scientific optimism and

human control over nature, but, as her distrust in technology grows, she finds comfort and reassurance in science itself. Gee celebrates neo-Darwinian ideas in order to buttress the view of humans as animals, yet in so doing she resorts to human unique activities: scientific knowledge and fictional writing. And there are few things more exceptionally human than literature and science.

## Chapter six

### Simon Mawer's *Mendel's Dwarf*

Chance and choice figure as major themes in *Mendel's Dwarf*. Simon Mawer explores the tension between both to illustrate the scientific quest for technological control over human nature. My argument is that, in his novel, Mawer attempts to bring back a sense of randomness to reproduction, a biological process that the novelist believes “ought to be left to chance” (SM, 704). As Zaner puts it, Mawer reinforces the ontological importance of ‘the accident of birth’ and, in so doing, he critically addresses the current shift from chance to choice in reproduction (Baillie & Casey 2005: 177-208).

I begin this chapter looking at Mawer's perspective of human nature. Mawer's understanding of what it means to be human rejects reductionism as a scientific method to explain complex human behaviour. I suggest that Mawer's ideas on that matter provide two important messages regarding the intersection of the spheres of science and society. First, he challenges the contemporary tendency to encapsulate humans' essence in the master molecule. Secondly, the author offers readers a critical view of the belief that scientific progress is a glorious and unstoppable journey (Mawer believes it is *not*).

This chapter also shows the ways in which Mawer explores the contrast between Mendelian genetics and molecular genetics in *Mendel's Dwarf*. From Mendel to DNA, Mawer perceives changes in terms of attitudes and goals regarding scientific knowledge. I argue that these disparate views affect, in Mawer's perspective, our understanding of what it means to be human. In trying to control and mould life at the molecular level, Mawer believes, “we have changed our view of nature” (SM, 613). In the following pages, I discuss how this transformation is expressed in *Mendel's Dwarf's* main character, Benedict Lambert. In Mawer's words, Benedict epitomizes ‘the fall from grace of modern biology’ (Mawer 1998).

Novels help to shape scientific knowledge for a general audience. They are part of a spectrum of sites of cultural practices where knowledge is negotiated. As readers, or as citizens, we cannot determine what science should find, but we can –

and ought to – discuss what challenges science and society might try to address. What pitfalls and risks should scientists bear in mind? What might we do with the several options new technologies offer? These are questions that Mawer raises using literary strategies that will be discussed in this chapter. In so doing, he shows us how a novel can be a place where scientific ideas can be challenged and scrutinized.

Reductionism, and its renewed expression in gene-centred disciplines, has implications for contemporary views of what it means to be human. Simon Mawer positions himself against the grain of reductionism. He believes that complex systems cannot be easily explained by their smallest parts. As such, deciphering the genetic programme that largely determines the structure of the brain, for instance, will not enable us to explain or predict the complex behaviour of humans. In Mawer’s perspective, human consciousness and self-awareness are “emergent properties”<sup>15</sup> that derive from complex systems – and, therefore, molecular biology cannot provide a definite account of such matters. As Mawer puts it:

“You certainly *cannot* be reductionist, because that doesn’t work. You cannot explain complex systems by individual elements. That’s the whole point. You get emergent properties from complex systems and, I suspect, consciousness emerges from a complex system. You cannot take individual bits or individual interactions. You know flatworms, they’ve got nerve nets. We will probably soon be able to understand exactly how they work. Every single bit of the nerve interactions. Yeah... but flatworms don’t have consciousness! And, at that level, I think we will never be able to understand it [consciousness].” (SM, 188-195)

The passage above shows how Mawer puts the brake on the notion that scientific progress consists of an unlimited forward march. He trusts that we will soon be able to understand every single bit of the nervous system of flatworms. But he sets

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<sup>15</sup> This term can be slippery in its own right. By emergent properties I mean the idea that new properties ‘arise’ out of more fundamental entities. Mawer’s views of the concept of emergent properties express his conviction that our understanding of human complex behaviour is – and will always be – limited.



out a limit to the scientific understanding of human nature (which suggests, to some extent, that Mawer grants to humans a degree of specialness). The boundary between the known and the unknown sits on complex features such as human behaviour or consciousness. In Mawer's perspective, scientists will never be able to unravel it. This is not because he believes in any metaphysical explanation for human subjectivity: Mawer is "completely materialist" (SM, 183-4). It is neither the case that Mawer rejects that the processes of life – including human complex behaviour – involve physical-chemical principles. He has no doubt that all events derive from a biological bedrock. One is simply not equipped to fully understand them.

While Mawer points out the problems of applying a scientific method – reductionism – to understanding human complex behaviour, he enthusiastically embraces its use to explain physical traits. In fact, Mawer has a particular way of observing humans. He often thinks of them at a genetic level. For example: when Mawer is talking to someone, he often pays attention to his interlocutor's earlobes. Are they attached or free? This is the sort of genetically determined physical trait that Mawer's trained eyes cannot help noticing. "All the time I do relate genetics to curiosities", Mawer says (SM, 152-3). This way of thinking of humans on a genetic level is obviously related not only to Mawer's scientific training in zoology, but also to his keen interest in genetics and phenotypes. As Mawer points out:

"I am very interested in genetics. Not in an obsessive way, but I always look to mother and daughter pairs. I saw a father and daughter yesterday walking along the street – I just wish I'd had a camera. He had a shaven head, a long face and a red rose bud mouth. He was holding his daughter's hand. She was six, five, blonde, long face, red bud mouth. The same expression. Identical, identical. And the thing is that these sort of things that really strikes me all the time. I immediately think: how does that work? You got fifty percent of your genes; she has fifty percent of her genes from the mother. Yet she looked like a sort of small caricature version of her father. That sort of thing happens all the time. . . . It is quite easy for me be slightly obsessive about appearance." (SM, 124-45)

The excerpt above shows how Mawer's interest in the workings of inheritance has implications for the ways in which he perceives human bodies. Another

expression of this is the way Mawer perceives the main character of *Mendel's Dwarf* (1997). The fact that Benedict Lambert suffers from achondroplasia, for instance, led the author to often visualize the character's fourth chromosome. This is because the mutation responsible for the most common form of dwarfism is situated on the short arm of the fourth chromosome. That particular behaviour of Mawer is also projected on Benedict and his first person narration:

'I clambered up onto the chair and sat there looking at him. He was balding (sex limited autosomal recessive), brown-eyed (autosomal dominant) and embarrassed (environmental/social character).' (52)

'The receptionist – Asian, as sleek as caramel and toffee – even smiled a warm and sympathetic welcome. Watch him: dusty red hair (RHC gene on chromosome 4), blue eyes (chromosome 19), lobeless ears, mean stature, dull mind, bad temper.' (300)

As a trained biologist, Mawer also claims to understand exactly what he means when arguing that someone has a gene involved in this or that trait. The same process happened with the creation of the character Benedict Lambert. Even though Mawer's perception of characters is that they are just "words on the page" (SM, 76) – i. e. he rejects the fantasy that "characters live in somewhere" (SM, 75) apart from the novel – the novelist had "a powerful perception" (SM, 78) of Benedict Lambert's bodily existence "for obvious reasons" (SM, 79).

These obvious reasons are the fact that, as someone with achondroplasia, Benedict experienced the world through a body that is not regarded as 'normal'. Those who bear the condition have short stature and bowed legs among other characteristic bodily traits. "I had to be inside of him. I had to see the world through his eyes", explained Mawer (SM, 83-4), who drew inspiration from a long time friend who also has achondroplasia. Mawer noticed that those with the condition are commonly extremely aware of the genetic details of their problem.

It is interesting to see how Mawer is prone to genetic explanations about human physical traits but is suspicious when what is at stake is complex human behaviour. Even though much of his view of human bodies is understood at the molecular level, Mawer stresses that the explanatory power of molecular genetics

cannot account for every human feature. This takes us to two important aspects of Mawer's understanding of what it means to be human in the DNA Age: first, a critical view of the contemporary tendency to encapsulate humans' essence in the master molecule; secondly, the belief that scientific progress is *not* a glorious and unstoppable journey. As Mawer puts it:

“I think we have a sort of illusionary view nowadays of humans' possibilities. Because we have all that genetics working, and a lot of molecular understanding, and then we think everything is molecules – you know, this sort of neuropsychiatry thing. But you cannot explain everything by molecules.” (SM, 160-4)

By rejecting the attempt to explain human nature using a reductionist approach, Mawer engages in a critical attitude that turns out to be twofold. He is not only distancing himself from currently fashionable disciplines such as evolutionary psychology but also criticizing an “illusionary view” that humans are fully entitled to decipher and control nature. For Mawer, it is inappropriate to scientifically observe human beings' small bits, as if they were part of a mechanical contrivance, if the goal is to understand complex human behaviour. Mawer's argument suggests that mental capacities cannot be looked at as atomized entities.

Mawer believes that complex systems cannot be studied in isolation. In so arguing, Mawer is drawing a line that molecular science is not able to cross – at least on the grounds of understanding human nature. This rejection of a progressive view of scientific knowledge inscribes Mawer's concerns with a degree of suspicion about science. This suspicion also appears to be rooted in the extreme examples of science overstepping ethical boundaries in the twentieth century. It comes, then, as no surprise that the relation between science and eugenics is a theme that, as I shall show in the next section, hangs upon much of the narrative of *Mendel's Dwarf*. This negative perspective is also stressed in the novel by the constant comparison between contemporary science practice, depicted as “money-driven” (SM, 583) and likely to ‘play God’ (Mawer 1998), and the exhaustive experiments Mendel disinterestedly conducted with garden peas.

## Mendel versus molecular genetics

*Mendel's Dwarf* is a novel about how genetics was turned into a matter of choice rather than chance. Due to the spectacular advances of molecular genetics, scientific knowledge and technology introduced a degree of predictability in questions of inheritance. What Mawer attempts to do in his novel is to bring back a sense of randomness to reproduction, a biological process that Mawer believes “ought to be left to chance” (SM, 704).

In this section I will show the ways in which Mawer explores the contrast between Mendelian genetics and molecular genetics in *Mendel's Dwarf*. I argue that these disparate views affect, in Mawer's perspective, our understanding of what it means to be human. In trying to control and mould nature at a molecular level, Mawer believes, “we have changed our view of nature” (SM, 613). This change of perspective, however, does not mean that Mawer sees a discontinuity in the scientific journey from Mendel to DNA. As Turney (2006) notes, Mawer argues for ‘a kind of continuity in the great project of taking charge of heredity’. Tudge (2002) would later follow the same narrative path – but in a non-fictional account – by tying ‘our 21st-century dilemmas firmly to the vision first forged by an obscure Moravian friar who was born in 1822’ (Turney 2006).

As I explained earlier in this study, *Mendel's Dwarf* juxtaposes three narrative threads: one is dedicated to a fictional character, Benedict Lambert; the other to a historical one, Gregor Mendel; and the third enlightens readers about abuses of eugenics, leading up to the horrors of the Second World War. Mendel was the Austrian friar whose works with garden peas in the 1860s established the existence of inheritance units. The main character of *Mendel's Dwarf*, Benedict Lambert, is a geneticist who happens to be the great-great-nephew of Gregor Mendel. By deciding that both characters would be relatives, Mawer was able to establish a parallel between classic and modern genetics. His objective was to explore “the genetics putting around [human] molecules rather than the garden peas” (SM, 362-6). As such, it was necessary to use both an omniscient narrator and Benedict's hindsight narration. As Mawer points out:

“And that was my start point. Looking back to it now, trying to know the reality. Who's going to know the reality? A relative. And that's why my

idea of making the character a relative. The obvious thing to do with the person who did the looking was to make it someone with a [Mendelian] genetic problem. I went through a number of them. . . . Cleft palate, and others... and then I came upon achondroplasia because it is a [single] point mutation. . . . Anybody can recognize someone with achondroplasia. . . . That's how I came upon achondroplasia. . . . Do you know a book called *Flaubert's Parrot*, by Julian Barnes? . . . That was an influence. You've got a character there, who is looking back to Flaubert; an amateur Flaubert expert going round Northern France, looking for Flaubert's traces, he's talking about Flaubert – but all the time what you discover is him. That's Julian's book. And that's what I was going to have: Benedict looking at Mendel, talking about Mendel, but all the time what you get is more and more Benedict.” (SM, 314-42)

Mawer's strategy also allowed explorations of the ethical issues surrounding Mendel's and Benedict's work on inherited traits. Whereas Mendel is depicted as someone interested in demonstrating that chance can be statistically predictable in the realm of biology, Benedict is more focused on how to defeat the odds. In this sense, there is a mindset shift from chance to choice. Benedict Lambert epitomizes 'the fall from grace of modern biology'(Mawer 1998). From Mendel to DNA, Mawer perceives changes in terms of attitudes and goals regarding scientific knowledge. Mawer describes Mendel's approach in the following way:

“He [Mendel] invented experimental biology. It was inevitable that he was going to be naïve. He was enormously sophisticated and advanced in his time. And I think it falls to us all the time. We are anything than naïve about it now. We are money driven. He wasn't money driven. He didn't have to put a grant application.” (SM, 580-3)

While Mendel is depicted as a naïve historical character, Benedict Lambert is presented as a sarcastic and ambitious molecular geneticist. Lambert is someone who knows how to take advantage of his own genetic condition and ancestry in terms of grant applications and self-promotion in the media. As we can see in the following excerpt:

'I followed the director, James Histone, into this other world. . . . His desk bore a shiny silver model of one turn of DNA, a shining spiral staircase that led upwards like Jacob's ladder towards an equivocal paradise. . . . On the walls there were framed photographs of the man himself with Crick, with Nirenberg, with Sanger. His main topic of conversation was money. He talked about supply and demand, production utilities and patents. 'We're in the market place now,' he kept saying. 'There are no free meals.'

I interrupted him: 'There is just one thing. I'm rather keen on my own research project. I'm confident I can get the funding for it...'

'Your *own* research project?'

'The identification of the gene for achondroplasia.'

There was a silence. . . .

His smile, at first larded with sympathy, metamorphosed. It became a careful, complex thing – a look of disappointment, a subtle blend of understanding and regret, a mute acknowledgement that the world is a bitter place and there is no alternative but to plough one's furrow as best one can. 'There's no money in dominants,' he said sorrowfully. 'Not unless they're late onset. No money, no future.'

'But I can get funding. That's one advantage of being... like I am. There are lots of organizations interested. The Little People of America, groups like that.' . . .

'He nodded. 'I understand your interest, Ben. Don't think I don't. But the world has moved on from those days when you could find something out for its own sake. Nowadays it has to have a commercial function.' Then he brightened up. 'Is it true what I've heard? You're some kind of descendant of Mendel? Is that true?'

. . . 'We could make something of it, you know. A bit of publicity never does anyone any harm. How about if I get in touch with the head of programming at the BBC? Good friend of mine. There's mileage in that all right. Might even get them to do a documentary. Would you be prepared? We must discuss it...?'

I smiled back at him. 'Only if I can have support for my project. I'll only

play the circus clown if you'll come along with me.'

'Bartering, eh?'

'The market place,' I reminded him.' (76-9)

Benedict eventually accepts taking part in a BBC2 programme exploring his personal struggle 'like a circus act' (262), stressing the fascinating irony of a dwarf scientist who has been awarded with a grant to study his own 'freak' mutation. In drawing the parallel between a dwarf working in a science lab and those performing in a circus, Mawer provokes the audience's curiosity about their bodily traits (and the social and emotional implications that these traits might involve). As we read in the novel:

'A *Scientist of Our Time* went on the air a few months later. You will have seen the thoughtful documentary. . . . Perhaps you asked yourself, why? . . .

Why did he waddle, like a circus act, across the television screens of the nation? Why did he climb, like a clumsy chimp up the rungs of a great helical DNA ladder constructed in the television laboratories out of plastic and metal, to perch on the key to his life-long search, an ADENOSINE:THYMINE base pair?' (262-3)

Benedict is indeed grant-oriented and familiar with the workings of the media – but this is not because he is a better or worse character than Mendel. Benedict is just a representation of a man of his time, a time when much of the politics of science are economically embedded in a liberal context. After all, as Mawer notes, Mendel and Benedict "are a hundred and fifty years apart" (SM, 612-3).

Mendel's relation with nature is also perceived by Mawer as different from that of Benedict Lambert. In *Mendel's Dwarf*, Mendel treasures nature as a magnificent realm that one can only – and humbly – try to understand. Nature is perceived as a whole, as a divine and indivisible creation rather than something that can be redesigned according to humans' preferences and needs. As Mawer puts it:

"I think he [Mendel] was working from a position in which nature was magnificent and possibly – possibly – a sort of manifestation of God

(although whether Mendel had a powerful idea of God I don't know, I'm not certain); whereas now we look upon nature as something that we are entitled to call to be. And that changes the approach. Nature is very much looked upon us. You can do anything you like, really." (SM, 589-94)

There is a shift from the idea of an untouchable nature to a mouldable, redesignable nature. Whereas Mendel – as Mawer understands him – is attached to a teleological view of nature, Benedict Lambert neglects this sense of unity of nature. Benedict personifies the contemporary human that thinks of nature as Lego, building blocks that can be played with.

"Legos. Yes. Lego, yes. Building, playing, we are almost like children. *The only restriction of the times are ethical ones*, concerning to things like embryo stem cells. But there you go; we can do basically anything we want. And we look upon nature as something we are completely entitled to interfere with. We are humbled a bit by size: the cosmos, you know, the Hubble telescope looks out into the cosmos, these millions and millions of galaxies. We should go: "oh, wow", but we go "oh, wow" for five seconds and then they, astrophysicists, get on to find out what they are, how far they are; whereas in Mendel's time I think there was much more an approach to the whole business of nature, a much bigger sense of the whole than we have now, the idea of nature as a whole. And I think this influences the way they show, they mirror their work. This is the difference of times; they are a hundred and fifty years apart. *We have changed our view of nature.*" (SM, 602-13, emphasis mine)

Mawer believes we have changed our view of nature because, today, we are no longer humbled by nature. He also suggests that what is big in terms of scale – the cosmos, for instance – may diminish the importance of human achievements, but only for a short period of time. When we move towards the molecular level, however, a sense of control over nature by technological means prevails. Humans have come to control matter at its smallest scale; from this new ability emerges the notion that human beings can be perfected, and so can human stock. It is here that the ethical problems mentioned by Mawer arise. If one considers that forms of life presumed to



be handicapped can be avoided, or even enhanced, we are then entering the realm of eugenics.

### **PGD and liberal eugenics**

*Mendel's Dwarf* is a book that bears the weight of eugenics upon it. And, again, the parallel between Mendel and Lambert expresses how the notion of eugenics has changed through time. Given that Mawer is interested in the ethical repercussions of both Mendel's and Benedict's research, the examples that make their way into the narrative come as no surprise. On Mendel's side, we find the uses to which Nazi authorities put inheritance research, making readers aware that the horrors of twentieth century are partly rooted in science. In their turn, contemporary examples exploring the ethical questions of eugenics focus on reproductive and genetic technologies, namely in vitro fertilization (IVF) and preimplantation genetic diagnosis (PGD).

In the following excerpts of the novel, we can see how the parallel between authoritarian and liberal eugenics is aligned with, and also enabled by, the intertwining of the Mendel/Benedict threads. A conference paper delivered by the character Benedict Lambert in Brno is the plot device used to convey this argument within the novel:

'It is one of the dangers of the historical perspective to mistake the momentous for the mundane. Nothing much had changed except that the balance of middle Europe had been reset. Nothing much had changed except that the German people had stumbled incoherently . . . a further step towards the apocalypse. Nothing much had changed, except that an unknown friar [Gregor Mendel] . . . had discovered the mechanics of inheritance and had, all unbeknown to himself, created a new science that was to be taken up by the *Gesellschaft für Rassenhygien* (The Society for Racial Hygiene) in 1905 and the Nazi Party two decades later. It was a science that would ultimately lead to the ovens of Auschwitz.' (236)

“Then there is the other matter, the question of genetic disorder. Forget

gene therapy. Gene therapy is way in the future. I talk of today. Today the same clinics offer screening for genetic disease and genetic diagnosis of pre-implantation embryos. Who can blame them? The demand is there, isn't it? Which of you would want a child with anencephaly, or Tay-Sachs disease, or" – the art of the well-tempered pause, timed to the nearest nanosecond – "achondroplasia?" Silence. . . .

"Now you can choose your embryos and implant only the healthy ones and thus avoid the unpleasantness and waste of having to abort foetuses that you don't want. Thus you improve the genetic stock without even mentioning the idea..." . . . "That is today. Today you can already screen for a thousand or so disorders. But what of the future? . . . In the future – the near future – you will be able to choose other qualities in the embryo: the child's eye colour, hair colour, skin colour, and height. . . . Hitler would have loved it..." (282-3)

Both excerpts cited above evoke eugenic practices embedded in a particular historical and social context. It is suggested that the main idea – to 'improve genetic stock' – remains the same, but in fact it is clear that its practices and motivations have changed. Precisely because the whole social, historical, political and economical context has changed, it is natural that the very meaning of the words has changed too. While eugenic policies of racial hygiene (negative eugenics) are commonly abhorred today, precisely because it remains clear that they led 'to the ovens of Auschwitz' (genocide), Benedict presents the use of genetic and reproductive technologies as fair tools in the parents' exercise of their procreative liberties (positive eugenics). In other words, the choice is now left to citizens/consumers rather than to the authorities. As Benedict's boss at the Royal Institute for Genetics in London says: '[w]e're in the market place now' (77). The main character in *Mendel's Dwarf* reinforces the point during a lecture he delivers in Brno:

"At least the old eugenics was governed by some kind of theory, however dreadful it may have been. The new eugenics, *our* eugenics is governed only by the laws of the market place. You get what you can pay for."

In the lecture theatre there is only silence; the silence of complicity.

"Are we really such intellectual dwarfs" – ah, they shiver at that one – "as

to imagine that the laws of supply and demand can be elevated to the level of a philosophy? Because that is what we have done. We have within our grasp the future of mankind, and as things are going the future will be chosen according to the same criteria as people now choose silicon breast implants and liposuction and hair transplants. It will be eugenics by consumer choice, the eugenics of the market place. All masquerading as freedom.” (284)

The logic of liberal societies lies in the idea that every citizen has an equal right to pursue his individual life projects. This view would never be associated with authoritarian or totalitarian eugenic programmes carried out in the first half of the twentieth century – compulsory sterilization of citizens regarded as unfit, for instance, is a form of denying to individuals the right to choose. Nevertheless, the logic of liberal societies can be easily coupled with liberal eugenics. Both encourage freedom, a notion that is embedded in the ideas of choice and of fulfilment of individual goals. In liberal eugenics, biogenetic control serves consumer demand and parental desire rather than the state authorities.

The shift from authoritarian to liberal eugenics is expressed in not only in Benedict’s sarcastic speech in Brno, but also in the character’s development within the novel. While Benedict revisits the political uses of scientific knowledge in the past, he is also looking at the future and aiming to develop an easy method of prenatal screening for achondroplasia. Drawing on real advances in this area, Mawer imagines Benedict identifying the location of the mutant gene (FGFR3).<sup>16</sup> He also conceives Benedict as the first scientist to perform PGD in embryos at risk for achondroplasia.

Benedict uses his authority and influence as a geneticist to conceive his own child through IVF. Using a method he has developed himself, Benedict selects a non achondroplastic embryo to be implanted in Jean’s womb. This attempt to circumvent the contingency of a life’s beginning will be punished in some way, as I will show later in this chapter. The ending is consistent with my argument that Mawer claims a degree of unpredictability in human reproduction. He argues this to maintain human

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<sup>16</sup> Mawer was inspired by three scientific papers sent by a former student (Merrer *et al.* 1994, Rousseau *et al.* 1994, Shiang *et al.* 1994). In order to convincingly portray the contemporary practice of molecular biology, Mawer visited some laboratories as his knowledge on biology “was old-fashioned” (SM, 418). When Mawer left university, he “only knew genes on the X chromosome” (SM, 418).

nature as we understand it today – flawed but creative, imperfect but surprising in its diversity and cultural products. As Mawer points out:

“And it’s interesting because I think reproduction ought to be left to chance because the alternative seems to be... . . . potentially boring, exactly that [Mawer puts his finger on a commentary he published in *Nature Genetics*], which I’ve written about. Living like Ken and Barbie. . . . But intelligent. But that’s a disaster! It’s *Brave New World*, isn’t it?” (SM, 703-14)

In his commentary in *Nature Genetics*, Mawer (2003) argues that reality is catching up with fiction. Like Fukuyama (2003), Mawer suggests that the nightmares evoked by Huxley (1973[1932]) in his *Brave New World* are indeed real threats to be considered. While scientists insist that they are ‘just getting on with their research, pushing back the frontiers of human knowledge’, Mawer stresses that the ‘road to hell is paved with good intentions, and the hell of *A Brave New World* [sic] was forecast long before the role of DNA was understood’ (2003: 454). Mawer believes that there is nothing wrong in creating a test to stop children from being born with a genetic defect or in having animals expressing human DNA but he is suspicious about what society will do with such powers. He recalls the eugenic policies in Nazi Germany and stresses that, despite the fact that DNA analysis of human racial groups has shown that the notion of race is a cultural construct, the ‘basic prejudices of eugenics are with us still’ (2003: 454).

Mawer’s main concern is that now society is guided by ‘the law of the market place’, therefore he reckons that the next half of century will be ruled by the preferences of consumers in the genetic superstore (2003: 454). In this context, parents will no longer want to have children with an artistic talent – they might well turn out to be disturbed like Virginia Woolf or Van Gogh. In Mawer’s view, what parents will demand most from the genetic supermarket of the future is offspring like Barbie and Ken, ‘the typical and the desirable, upgraded just a shade with whatever it takes to succeed in the market’ (2003: 454).

It is precisely Mawer’s suspicion towards a liberal and market-driven posture that leads to the central idea of the novel. In order to meet the laws of the market, the new eugenics will favour the mainstream and, in so doing, will undermine the sense

of diversity in human nature. What Mawer praises in the uncontrollability of the contingent process of human reproduction is the possibility to preserve human nature itself. His position is more concerned with the type of society we want to live in than with the ethical issues that embryo destruction or abortion involves.

“It’s *Brave New World*. . . . I will just make clear my position, my position on abortion is entirely pro choice. But [take] a conversation between two doctors working on reproductive area, and one says to the other: ‘I’ve got a case of a woman: she’s pregnant, she has nine children, she’s single, she’s alcoholic, she’s got syphilis (I think), she’s completely impoverished, and the whole lot of things, you know... what do you do?’ And the other doctor says: ‘Terminate pregnancy.’ And the other doctor says: ‘You have just aborted Beethoven!’ And abortion is a phenomenally crude way of doing it because, you know, you can solve the problem now, much earlier. You don’t even get the chance of getting pregnant with Beethoven. You can eliminate all the problems in the womb, like congenital deafness. You can solve that. You can solve all the problems. And we become Ken and Barbie. I won’t be around to see it. But maybe there are expectations about the changes. It’s true, many of the geniuses – and I’m not saying Virginia Woolf was a genius [laughter] – many of the great artists have, had, problems, psychological problems, and we are in the process of trying to remove all of that.” (SM, 725-40)

Mawer’s view suggests that conditions such as psychological problems are an inherent part of the human condition. He understands these problems in the light of the metaphor of the oyster and the grain of sand: pearls are only produced at the expense of oysters’ well being. In this sense, Mawer’s perception of human nature is in agreement with thinkers such as Francis Fukuyama, who argues that pain, depression, loneliness and other debilitating conditions are an inherent part of the human condition. In removing the grain of sand, it stops the discomfort of the oyster – but also the production of pearls.

It is interesting to note that Mawer does not put emphasis in common ethical

problems that arise from PGD and embryo research.<sup>17</sup> He does not mention, for instance, the foetus' future disquiet about having been an object of the genetically fixed intention of a third person. This is because his concerns are not with how we deal with human life before birth but rather with the sort of society we aspire to (and the ways in which science, or its applications, helps to shape it). From the ethical point of view, Mawer is also interested in understanding *how* we changed our attitude towards human nature. The parallel he established between Mendel and Benedict (i.e. past and present) also helped him, in terms of literary device, to investigate this change.

“I think one of the things that interested me in the ethical point of view is how we change our attitude. I think that happened in my life – not yours [giggle]. . . . Thirty years ago... things changed and shifted. I think about all those things about stem cell research, embryonic stem cell... I don't mind people getting excited about it now, they think they are entitled to do it all with stem cells. And in fifty years time, maybe twenty – it can be much longer, of course – the objectors die, that's the point. Ethics change not because people change their attitude. It's not because people change their minds, it's because people die. And the next generation has a different attitude. . . . And it happens all the time in science. You get a new development in science. It is not because all the scientists discover something new and they all change their minds. The previous generations soon get old and retire and die; and the new generations have new ideas. . . . All these people ranting about embryonic stem cell research, they may, or may not, want wonderful justified evidence but they will get old and die. And the next generations will not have those ideas.” (SM, 790-98)

Mawer's conclusion about how new attitudes emerge (and progressively prevail) in science and society suggests that, in his opinion, at least in the specific case of biotechnology, any attempt to refrain, reframe or even moralise technological applications is useless. This idea of a 'slow acceptance' of new biotechnologies may

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<sup>17</sup> For an analysis of those debates in the United Kingdom and Germany, see Habermas (2003) and Nerlich (2003).

not be part of the culturally dominant view but it has been echoed during the last two decades. With regards to human cloning, for instance, Kolata (1997) reported in the year Dolly the sheep was cloned ‘an enormous change in attitudes in just a few months’. A decade later, a United Nations report considered that the birth of a human clone may be in fact ‘inevitable’ (Chamundeeswari *et al.* 2007).

Mawer’s claim that it is useless to avoid new biotechnologies is less a warning than a recognition of an inevitable future. Warnings are given when we expect the course of history to be changed. This of course begs a couple of questions. If Mawer believes that changing attitudes in science are inevitable, why did he bother to write a novel warning against the social consequences of PGD? Why carefully construct a novel suggesting that new eugenics can be more dangerous than the old one? And why should we believe attitudes are liable to change in one direction and not in another? What is the point of denouncing pressing issues if they are considered unavoidable? It seems clear that Mawer points the finger at the new eugenics expecting this critical approach to reverberate and reach wider audiences. As a novelist, Mawer knows how powerful stories can be. Narrative imagining, as Turner (1996: 4) argues, is indeed ‘the fundamental instrument of thought’. In denouncing the unavoidable we are trying to make the unavoidable avoidable. And even if the attempt is doomed to fail, the act in itself is a way of better understanding or dealing with pressing issues.

### **Leaving reproduction to chance**

How does Mawer turn the unavoidable avoidable in the realm of fiction? The author worries about the way the practice of bioengineering may become dangerously market driven. His way of expressing this preoccupation with the future bears both a degree of pessimism and a sense of inexorability: ‘[s]o the next fifty years of the history of DNA looks set to be consumer-driven’ (2003: 454). The logic of the market law, as Mawer sees it, will push forward the idea that nature (including the human body) can be fully and easily manipulated at its smallest scale, so that it can provide customers with tailor-made solutions. In his novel *Mendel’s Dwarf*, however, Mawer devises an ending that challenges this notion. His professional response to the changing view of human nature consists of introducing a degree of unpredictability in a literary

representation of questions of inheritance.

In *Mendel's Dwarf*, the character Benedict Lambert fails to eliminate chance from the equation of human reproduction. When Jean, the woman he loves, asks his help in order to get pregnant (because Hugo Miller, her husband, is infertile), Benedict takes the unethical step of swapping sperm samples and ensures that Jean's baby is his son as well. Benedict Lambert uses his privileged position to produce and select embryos through IVF and PGD in the laboratory where he works. The geneticist acknowledges that, despite the techniques of genetic control, there are aspects of the processes that resist to human control:

'There are still moments in the manipulation of man or molecule when you are powerless. . . . You split two glistening embryos through a catheter tube into a receptive womb... and wait, listening. Human chorionic gonadotrophin, a 25 kilodalton glycoprotein hormone, is the first cry a budding infant makes, a tiny molecular cry for recognition amidst the roaring and screaming of the mother's blood. You sample at day fourteen, listening for that cry, sniffing antibodies for that infinitesimal scent.' (252)

But once Ben hears that Jean is pregnant, he feels 'a sharp lance of anguish for the child's future muddled with a sensation of triumph' (255). Benedict Lambert experiences a position even more powerful than that of God. The geneticist does not leave reproduction to chance – Ben is able to choose. Triumph and victory here are feelings associated with the act of replacing chance by choice. Benedict had in his hands eight embryos, four of them carrying the achondroplasia mutation. It was up to him to decide which ones would be implanted in Jean's womb.

'Here's another question: Benedict Lambert is sitting in his laboratory playing God. He has eight embryos in eight little tubes. Four of the embryos are proto-Benedicts, proto-dwarfs; the other four are, for want of a better word, normal. How should he choose?

Of course we all know that God has opted for the easy way out. He has decided on chance as the way to select one combination of genes from another. If you want to shun euphemisms, then God allows pure luck to



decide whether a mutant child or a normal child should be born. But Benedict Lambert has the possibility of beating God's proxy and overturning the tables of chance. He can choose.' (249-50)

Ben chose the 'normal' embryos, as requested by Jean. They were implanted in Jean's womb and one of them developed into a tall baby boy. Ben manages to defeat the odds but, by the end of the novel, unanticipated elements are introduced in the narrative. Jean unexpectedly slips into coma after labour. Ben is not prepared for this turn of events as he believes chance and luck are removable when science is in control. As we can infer by a telephone conversation between Ben and Jean:

'Jean. Where are you?'

'At the hospital.'

...

A murmur and a twittering somewhere on the line. '. . . Aren't you going to wish me luck?'

I told her she didn't need it. I told her that luck didn't come into it. But I wished it just the same.' (15)

'Next morning I detached myself from the congress. . . .

And what was I looking for? Good luck as well? I was thinking of Jean, of course. I was thinking of Jean and I was thinking of luck, which is merely chance masquerading under an alias – the tyranny of chance.' (16)

Benedict thinks that chance was unnecessary but, in fact, Jean would have benefited from what we commonly call 'good luck'. Having Jean lying comatose and his own son in a cot beside her bed, the geneticist experiences 'bewildering coils of sensation': 'triumph, curiosity, horror, anticipation, plain fear' (288). Ben finally grasps that he was caught by chance: 'A multiple hybrid of emotion, a monster spawned by the malign hand of chance' (289).

Ben also experienced a sense of victory while revealing to Hugo Miller he was betrayed. Jean's husband discovers little Adam could not be his son using Mendelian genetics – the baby's eyes are brown whereas Jean's and Hugo's are blue ('I've done my homework, Ben. I know about all this Mendel stuff', 294). The same geneticist

who warned a whole audience in Brno against the risks of the new eugenics felt victorious about its use for his own convenience:

‘I looked to Hugo Miller sitting there in front of me, replete with bigotry. ‘You don’t need any tests,’ I told him. ‘You don’t need any tests because I can tell you the answer here and now. . . . *I* am the father. Ridiculous Ben Lambert is the father. Adam is ours – Jean’s and mine. . . .

There is an absurdity about the cuckold, isn’t there? Always was, always will be. Cuckold Syndrome. The 10 per cent of all happy and oblivious and, above all, faithful husbands who are not, in fact, the fathers of their sons and daughters. Something both absurd and touching. There is even a trite little evolutionary argument to explain their existence, that women choose them as husbands for reliability and protection, whilst seeking out some strapping, youthful genes to unite with their own and thus make genetically fit babies: the mother bird inviting the cuckoo to come into her warm little nest.

. . . I confess to a feeling of mild elation. Not triumph, nothing excessive: but the plain feeling I had won. Benedict had achieved his child and passed his precious genes on to the next generation. Adam the man was in some new sense mine; and Jean, comatose or not, would become mine too.’ (295-6)

Benedict passed his genes on to the next generation and, in so doing, the geneticist felt he overcame, in some way, his own genetic condition (‘I was the man I had always longed to be. I was tall’, 291). But this assumed biological advantage was not enough to ensure the baby’s survival. Jean’s husband discovers Benedict’s plan and kills the baby in the maternity cot. It is precisely Jean’s unexpected condition that offers Hugo the opportunity to enter her room in the clinic, to put on some music by Leoš Janáček<sup>18</sup> and to suffocate the baby: ‘[f]rom Mendel to the future: the tenuous

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<sup>18</sup> Leoš Janáček (1854-1928) was a Czech composer. He took part as a musician in Mendel’s funeral. Mawer introduces such historical detail in the narrative: ‘. . . the choir is conducted by a small, bouncy little fellow who was once at the choir school. . . . He is Leoš Janáček’ (297). This option reinforces a constant parallel between Mendel’s and Benedict’s narrative threads: Mendel dies, Benedict’s son is murdered.

chain of descent, the passage of DNA down to generations, was soon broken' (304).

Cassar (2005) interprets the murder in the light of evolutionary psychology. In her PhD thesis, she argues that 'this sort of infanticide is widespread in the animal world, where cuckolded males regularly kill offspring that are not related to them' (2005: 145). Cassar then concludes that Ben's quest to eliminate chance is 'frustrated by chance itself and by what evolutionary psychology describes as deeply ingrained patterns of behaviour that are the result of millions of years of evolution'. While I see Cassar's interpretation as plausible – Mawer himself compares adulterous woman to a 'mother bird inviting the cuckoo to come into her warm little nest' – from the genetic point of view, Miller's motivations remains unclear.

Even if we consider that this violent behaviour could have evolved in males through Darwinian selection – research on infanticide in various animal species is highly controversial (Rees 2009) – and even if we allow a projection of this behaviour onto the human world, this line of argument ignores an important dimension: infanticide does not increase Miller's chance to breed for he is infertile, and his evolved brain is fully aware of this information.

It is also true that evolutionary psychologists address infanticide among humans, stressing that this morally unjustified behaviour is not necessarily related to reproductive fitness. Robin Dunbar and others (2007) note that there are parental investment decisions that take into account a wide range of factors, but none of them seems to match Hugo Miller's case:

'Parental investment decisions are based on allocation of scarce resources. . . . Children that have little or no prospect of future reproduction are likely to experience underinvestment, or, in extreme cases, infanticide. . . . Importantly, studies of parental investment decisions highlight the conditional nature of human behaviour: parents make decisions about their children with specific reference to the social, economic and ecological circumstances in which they find themselves.' (Dunbar *et al.* 2007: 108-9)

What I would like to stress here is the idea that infanticide in *Mendel's Dwarf* might be less adaptive than pathological regarding the fact that, throughout the novel, Hugo is depicted as the violent and short-tempered man who lives at Galton Avenue.

The rationale of Hugo Miller's behaviour appears to be his wrath about being betrayed – and also 'cytologically cuckolded' (288) – by his wife with someone he considers an aberration, someone who should have been sterilised ('[s]hould people like you be allowed to breed?', 115).

All the same, Cassar is right in arguing that Ben's desire to undermine chance is frustrated by chance itself. What gave Hugo Miller the opportunity to murder baby Adam was precisely Jean's comatose state, which was an unexpected outcome in the chain of events presented by the novel. And this brings me to my central argument: Benedict's quest for scientific certainty and biotechnological control over the human body eventually fails due to chance. The unexpected takes place as if showing to the geneticist that not everything can be foreseen, ruled and determined by science. At least in the literary arena, Mawer manages to ensure that reproduction is left to chance.

## **Conclusion**

In this chapter, I have shown how Mawer structures his narrative in such a way that unpredictable events, in reintroducing the role of chance, counterbalance the attempt of science to control human biology by technological means. I have also focused here on the problems raised by the slippery boundary between personal health care and liberal eugenics.

Simon Mawer is convinced that we have changed our view of nature. The author believes we are no longer humbled by it, we have indeed a sense that humans are entitled to play with our elementary parts as if they were Lego blocks. Mawer is suspicious of this expression of human hubris as much as he is of the idea that scientific progress is unlimited. The raw stuff of humanity will never be fully explained by science and its contemporary reductionist approach. Even though science is presented by Mawer as unprepared to understand complex human processes – such as self-consciousness or symbolic thinking – science is understood as something that can be used to *alter* the expression of those human features. It cannot unveil the inner workings of human nature, but it can transform human nature. That is why Mawer emphasizes the contingency and naturalness of procreation. He believes reproduction ought to be left to chance so that human nature, as we understand it, can

be preserved.

Mawer's discourse embraces an attempt to reassert human nature at a time when it is haunted by the prospect of post-human futures, as described by contemporary critics (Fukuyama 2003, Habermas 2003, McKibben 2004). What distinguishes humans from other animals and machines is precisely the ability to write a sonnet or compose a concert, for instance. It is this ability, or uniqueness, that Mawer believes to be under threat with liberal eugenics. In trying to eliminate all the pain and discomfort of human life we may cross the threshold of human nature itself. In that sense, he gestures towards Habermas' ideas: '[t]he desensitization of the way we look at human nature, going hand in hand with the *normalization* of this practice, would clear the path for liberal eugenics' (Habermas 2003: 71).

In *Mendel's Dwarf*, Mawer also investigates the ethical, historical and philosophical repercussions of Mendel's legacy. Even though Simon Mawer's novel takes place in the present, his discourse is mainly concerned with the future. Mawer's arguments allow us to have a glimpse of how society and science are imagined in his head. That future does not look good. It can be described, to some extent, as an updated *Brave New World*. Mawer envisages the social implications of a newfound biogenetic control that, unlike Huxley's dystopian scenario, is ruled by consumer demand and parental desire rather than state authorities.

## Chapter seven

### A.S. Byatt's *A Whistling Woman*

Byatt's fascination with Darwin's legacy is well known. While her contribution to the exploration of Darwinian themes within novelistic plots is documented, little material has been published about Byatt's literary references in the context of modern genetics. Byatt sees the journey from Darwin to DNA 'as continuity rather than a disruption' (ASB, 48), but the novelist considers that deep transformations took place in Darwinian discourses since 1953. One change is the attempt to anchor human ethics in biology.

The unveiling of the molecular structure of DNA opened a new wave for Darwinism, and gene-centred disciplines subsequently thrived. In an essay, Byatt (2000) claims that books like Richard Dawkins's *The Selfish Gene* (2006 [1976]) and Matt Ridley's *The Origins of Virtue* (1997) helped to push Darwinian arguments into the field of ethics and politics.<sup>19</sup> 'It seems inevitable', she argues, that these 'profound changes' in 'the nature of human relations should give rise to changes in the forms, as well as the subjects, of fiction' (Byatt 2000: 65). The overarching idea here is that human morals and ethics can be placed on a scientific basis.

In this chapter, I look at examples of those changes in *A Whistling Woman*. I pay particular attention to the effects of these new Darwinian ideas in human behaviour and relations, as they are represented in the novel. I argue that Byatt draws on the notion that human behaviour is biologically built-in. My chief claim is that what Byatt does in her novel is to explore the implications of this belief while testing them in her own characters. The results, as we shall see, are open to doubt. Despite the fact that Byatt's perception of human morality and ethics relies greatly on biology, the novel's ending is inconclusive in this respect.

This chapter is divided into three parts. First, I look at Byatt's personal view of

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<sup>19</sup> In her essay, Byatt cites Matt Ridley's book as if it was entitled as 'Altruism'. To the best of my knowledge, this book title does not exist. I assume Byatt meant *The Origins of Virtue*, which is in Ridley's oeuvre the only book exclusively dedicated to the role of altruism in society. In this book, Ridley relies on evolutionary biology to argue that society 'was not invented by reasoning men' but in fact 'evolved as part of our nature'. Mutual aid and altruism are, Ridley argues, 'as much a product of our genes as our bodies are' (Ridley 1997: 6).

humans. This section will provide us with a frame to understand Byatt's literary depictions of human nature, which are influenced by evolutionary biology. Secondly, I pay attention to Byatt's avid consumption of scientific knowledge. This is important to a better understanding of the cultural products that helped to shape Byatt's perception of biology and human nature. It becomes clear that popular science books play a crucial role here, even though other forms of science communication cannot be overlooked. This includes public events with scientists, academic papers published in scientific journals and informal conversations with scientists (who can be simultaneously friends, as happens with the geneticist Steve Jones).

Finally, in the third and last section of this chapter, I analyse excerpts of the novel exploring examples of characters' behaviour or morals placed on a scientific basis. My example concerns the biological origin of ethical values. It involves Hamilton's rule and a character who is a twin. This character finds Hamilton's kin theory deeply disturbing due to its attempt to provide a genetic explanation for familial bonds. This scientific account of human love is perceived by the character as something that may destroy human morality.

Byatt's notion of what it means to be human strongly relies on biology. This allows Byatt to work on a concept of morality without God, thus challenging the notion of religion as the bedrock of moral values. Byatt also distances herself from the notion of human exceptionalism, rejecting the concept that human beings are special creatures. As the novelist puts it:

'It depends what we think, what I think, it means to be human – and from being a small child I have never liked the religious idea of the special nature of human beings – I see us as a very clever animal, and this is true at the molecular level too. I learned all about the eighteenth-century "great Scale of Being" at university – the ladder leading upwards to Man as the summit – and I always thought it was dangerous and led to dangerous behaviour. I am much more suspicious of ideas like "free will" and words like "spiritual" and even "consciousness" than I am of scientific observations which are, or should be, always provisional.' (ASB, 94-102)

As an atheist and as a Darwinian novelist, Byatt dislikes the theological concept that all forms of life are hierarchically arranged in a ladder. This pre-evolutionary concept was persistent in biology. Its pervasiveness stretches back to Aristotle and survived into the early nineteenth century. After that, Cuvier opposed the idea that the scale of being was a continuum designed by a divine creator. He did that by setting out an evolution theory. Yet it was Darwin's theory of evolution by natural selection, published in 1859 in *The Origin of Species*, which provided a way to account for both the genesis of adaptations and their change over time. The importance of Darwin's contribution relies on the fact that his evolutionary explanation deals only with materialist forces, neglecting non-material forces such as will or God. The drive to explain humans in a materialist fashion remains strong in modern genetics. To a certain extent, this explains why Byatt sees the journey from Darwin to DNA 'as continuity rather than a disruption' (ASB, 48) despite the fact that Darwin missed the point of genes as the inheritance units.

Humans are not regarded as exceptional in the chain of being – Byatt, like Maggie Gee, thinks of humans as intelligent beasts. 'I see us as a very clever animal' (ASB, 96). This perspective is not unrelated to the fact that genetic research, as Fernández-Armesto (2005) notes, has recently given us means of calibrating how much we have in common with other species. Byatt believes that what DNA shows – confirming old Darwinian principles – is how closely related every form of life is. Byatt enjoys thinking about genetic information as an ontological and aesthetic exercise: 'I like to feel out what I do and I don't have in common with nematode worms, and [the] buffalo, and butterflies and sixteenth century men, and I simply find the genetic information beautiful and exciting' (ASB, 103-6). This exercise acknowledges a gradual development in nature in which the 'lowliest' and the 'highest' forms of life are always somehow connected.

If A.S. Byatt and Maggie Gee converge in abolishing humans' exceptionalism, they address differently the differences between humans and other animals. While Gee wants humans to be regarded and understood as animals, Byatt needs to draw a line of some kind between animals and humans. In an essay about the construction of the novella *Morpho Eugenia*, Byatt wrote: 'I see insects as the Non-human, in some sense the Other, and I believe we ought to think about the not-human, in order to be fully human' (Byatt 2000: 115). Even though Byatt regards humans as 'clever



animals’, she believes in a boundary – at least a psychological one – in order to make sense of what is uniquely human. She believes that understanding human nature is simultaneously a cultural and scientific process.

The writings of the evolutionary biologist W.D. Hamilton influenced Byatt’s ‘ideas about nature and nurture, genes and structures’ (ASB, 176-7). Even though the nurture and nature debate is too complex to be reduced to two opposite sides, we learn from Byatt’s comments that she positions herself mainly in favour of nature:

‘I don’t think I do feel everything changed when we began to think at a molecular level. The discovery of DNA confirmed the general Darwinian points about heredity – *I spent a lot of time reading Richard [sic] Hamilton*. People seem to be less sure nowadays about the ineluctability of natural heredity – of the superior strength of nature over nurture. But *I have been excited by the rigorous arguments in favour of nature.*’ (ASB, 82, emphasis mine)

A.S. Byatt appears to rely more on biological heredity and she also suggests that knowing who we are born to is decisive to our sense of identity (‘I believe that nature is ignored at our peril . . . I am very disturbed at the idea of a woman bearing a child from an egg . . . not by nature her own’, ASB, 124-6). In this respect, Byatt makes a gesture towards Francis Galton’s notion that ‘the prime human right was to know who were our genetic parents’ (ASB, 128).

### **Byatt’s avid consumption of scientific information**

While researching for the quartet, of which *A Whistling Woman* is the final part, A.S. Byatt read about biology, evolution and neuroscience. ‘I don’t exactly distinguish between the disciplines – I follow up clues about what I need in bibliographies and footnotes’ (ASB, 151-2). From Antonio Damasio to Edward O. Wilson, she seems to have read most of the contemporary scientists who conveyed their ideas in texts dedicated to a wider audience. Byatt also declared in an essay that her ‘world has been changed by all the scientific writers who have made their understanding approximately available’ to her (Byatt 2005: 297).

‘I have read Richard Dawkins, E.O.Wilson, Richard [sic] Hamilton, Steven Rose, Lewontin, Francis Crick, Gerald Edelman, Antonio Damasio, John Maynard Smith, Howard Gardner, Semir Zeki, Jean-Pierre Changeux, Richard Gregory, Nikolaas Tinbergen, Konrad Lorenz, Patrick Bateson, Colin Blakemore Ian Hacking, Lewis Wolpert, Matt Ridley, Jean-Pierre Dupuy, J.Z.Young, Jacques Monod, d’Arcy Thompson, Johnjoe McFadden, Alain Prochiantz, John Barrow, Helena Cronin, and so on and on. [...] I have 3 bookcases full of these books and can’t list them all – my life has been transformed by Amazon Prime.’ (ASB, 145-53)

Byatt also contacted a few scientists directly so she could have a better understanding of the scientific ideas discussed in the 1960s, which is when the story of *A Whistling Woman* takes place. She acknowledges nearly 15 scientists in the last page of the novel *A Whistling Woman*. One of them is Steve Jones, Byatt’s close friend, the person ‘who knew most of what is to know, both about snails and about genetics and about genetics of snails’ (ASB, 70-1).

‘I am grateful to many people in many ways for help with this book. Steve Jones and Frances Ashcroft have been patient with my queries about snails and genetics, physiology and cognition, and have been creative with their suggestions. . . . I am also grateful to Steven Rose, Helena Cronin, Robert Hinde, Pat Bateson, Matt Ridley, Richard Dawkins, John Maynard Smith, Antonio Damasio, Semir Zeki, Marion Dawkins and Arnold Feinstein for help with science’ (422)

In our interview, Byatt also mentioned the importance of Steve Jones and Francis Ashcroft in the writing of *A Whistling Woman*:

‘I am grateful to Steve Jones for many things – for instance when I needed an experiment which plausibly brought together snails and the study of neurones in the brain, he was able to tell me about large snail neurones and introduce me to the researcher who did the research itself. I am also

grateful to Fran Ashcroft, professor of physiology at Oxford, who spent a long time explaining to me what “action potential” meant, and suggesting experiments for [the character] Jacqueline. I read Erik Kandel and J.Z.Young in that context too. Both Steve and Fran had a very strong sense of the history of science and were able to tell me what people were thinking about at the time of my novel, as well as now – scientists appear to be mostly uninterested in what has gone past. I got a lot out of going to the LSE Darwin seminars and just listening.’ (ASB, 153-63)

Byatt read books on cognitive science too. In *A Whistling Woman*, Hodder Pinsky’s opening address in the Body and Mind conference was entitled ‘Metaphors for the Matter of the Mind’ (353). Whereas the character’s name results from a cross between the names of the real cognitive scientists Steven Pinker and Noam Chomsky, the work presented at the conference is more related to Ulrich Neisser’s book *Cognitive Psychology*, published in 1967 (Byatt 2005). Unlike Descartes’s tradition of thought, Pinsky believes there is ‘no ghost in the machine’, he is ‘convinced that brain, nervous system, and mind were the *same thing*’ (353).

Byatt also read W.D. Hamilton’s oeuvre. It was W.D. Hamilton the scientist who influenced most her opinion about genes and environment. As she put it: ‘[o]f them all, it was Hamilton who changed my ideas about nature and nurture, about genes and structures’ (ASB, 176). Hamilton’s ideas on sex, altruism and kin selection reappear in the conversations of her character the geneticist Luk Peacock with other characters. We will see in the next section of this chapter how Peacock devises these ideas in the 1960s, and how, in so doing, he triggers John Ottokar’s anxieties about genetic fate.

Hamilton is one of Richard Dawkins’s intellectual heroes in the book *The Selfish Gene* (Dawkins 2006 [1976]: xiv). But if it was Hamilton who most influenced Byatt, why did she mention Dawkins’s and Ridley’s books as the ones which provoked ‘profound changes’ in ‘the nature of human relations’ (Byatt 2000: 65), thus having an impact on the forms and subjects of fiction? Perhaps the explanation is the fact that both Dawkins and Ridley offered, in a grand narrative style, a gene-centred view of life. Although *The Origins of Virtue* was written two decades after *The Selfish Gene*, both can be read today as texts which attempt to stress altruism rather than selfishness. In the introduction to the 30<sup>th</sup> anniversary edition of *The Selfish Gene*,

Dawkins tries to deconstruct a common interpretation of his appealing title: '[t]he best way to explain the title is by locating the emphasis. Emphasize 'selfish' and you will think the book is about selfishness, whereas, if anything, it devotes more attention to altruism' (Dawkins 2006: viii). The correct emphasis, says Dawkins, is on genes – hence his interest in narrating from the gene's point of view. Twenty years later, Matt Ridley wrote a book on the genesis of human altruism and made sure that the title could be only read in a positive light: *The Origins of Virtue* (Ridley 1997). Byatt acknowledges both Dawkins and Ridley in *A Whistling Woman*.

All these acknowledgements suggest an intense dialogue between the experts and the novelist. As Byatt does not have a scientific training, she can be considered as a member of the lay public. But Byatt herself is communicating science when she writes a book such as *A Whistling Woman*, a novel that explores complex cultural images of science and scientists. (And scientists should not be excluded from the group of potential readers of literary novels: scientists 'are human beings who even, from time to time, read novels', as Sleight (2011: 23) ironically argues.) Like other novelists studied in this thesis, Byatt should be regarded as both consumer and producer of media products that help to shape public understanding of science. Byatt is not simply interpreting scientific knowledge for non-scientists, nor is she part of a one-way information flow, beginning with the experts (who provide scientific facts to writers) and ending with writers (who, then, popularise scientific knowledge for lay readers). This model has serious limitations: it posits readers as passive consumers of media communications, suggesting that the science-based information that circulates in our society is produced in a linear chain of events (Hilgartner 1990). In contrast to this, Byatt critically consumes scientific information and adapts it to her fictional texts according to her own literary needs. Her values may not be the same as those of scientists. It is natural that the media artefacts produced with science-based information present an adapted and edited version of the ideas originally collected. Novelists, as any other member of the public, are not passive consumers of scientific knowledge.

As Hilgartner (1990) argues, the boundary between science and its popularisation is blurry. It is true that Byatt needed to be in touch with experts in order to properly represent science and scientists in her novel, and that, in so doing, she buttressed the epistemic authority of scientists. But it is wrong to see her novel as just an appropriate simplification of scientific ideas. Novelists are as much part of the

construction of public discourses of science as journalists, historians, technical practitioners, sociologists of science and members of the public. Scientists should not be placed above those social actors in the 'genetic theatre' (Dijck 1998).

### **Genetics and human morality**

Characters' discussions of scientific claims often revolve around disbelief or trust. Byatt offers in *A Whistling Woman* a variation of this central problem in the field of science communication: one can trust in scientific knowledge but respond to it with hopelessness rather than disbelief. John Ottokar's attitude towards genetic research is one example of this middle ground between the sceptical and the trustful views of scientific knowledge. The character has an objection to the work developed by the geneticist Luk Peacock. Ottokar acknowledges that Peacock's ideas are reasonable but rejects them because they undermine the meaning of human relations and the sense of human purpose.

John Ottokar is a 'very respectable mathematician' who has been offered a post in the University of North Yorkshire, where he will write computer programs for Peacock and other scientists (59). Ottokar 'programs soulless computers' as he masters the language that enables machines to communicate (59). Peacock also works on the verge of a particular language, but this one 'universal': 'the language of the 4 letters of the DNA' (ASB, 56-7).

As a geneticist in the late 1960s, Peacock discusses not only John Maynard Smith's ideas but also W. D. Hamilton's. He seems to incarnate the archetype of the genetic deterministic scientist. Snails are his preferred animal model to study population genetics;<sup>20</sup> his scientific interests gravitate around 'John Maynard Smith's searching questions about the greater cost for a species (in energy used up) by sexual reproduction compared to parthenogenesis' (213).<sup>21</sup>

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<sup>20</sup> Snails are, too, the 'solidified metaphor' chosen by A. S. Byatt to symbolically represent the DNA and its helical shape (ASB, 61) in *A Whistling Woman*.

<sup>21</sup> Parthenogenesis is a form of asexual reproduction; many organisms (e. g. snails) clone themselves through that process. Peacock is particularly puzzled by the fact that many organisms invest an enormous amount of energy in sexual reproduction when they could, in theory, simply bud or clone. Asexual reproduction and male redundancy are closely related ideas in Peacock's discourse.

In an article published in *Nature*, A.S. Byatt mentions that she met John Maynard Smith at a Darwin seminar at the London School of Economics. Afterwards, the evolutionary biologist sent her a paper on the mechanics of biological growth according to the maths of Fibonacci spirals (Byatt 2005: 295). Byatt's fascination with 'a sense that an invisible mathematical order informed all our physical accidental world' led her to make Marcus Potter (Frederica's brother), at the end of *Babel Tower*, move from studying computers as brains to dedicate himself to those spirals (Byatt 2005: 295). Similarly, Hamilton's writings inspired Byatt to make the character John Ottokar uncomfortable with genetic ideas in *A Whistling Woman*. Nevertheless, for this to occur within the plot, Ottokar needed to become familiar with the evolutionary ideas emerging in the 1960s. Peacock was the key to this plot's requisite.

In *A Whistling Woman*, Peacock's studies on sex and altruism involve a great deal of maths and computing. Since the geneticist relies on John Ottokar to accomplish this practical part of the research, both spend much time discussing the main topics of Peacock's research. These conversations between Ottokar and Peacock allow the reader to grasp a progressive shift in Ottokar's ideas about selfhood, family and love. In an early dialogue in *A Whistling Woman*, Peacock presents animal life without the rose tinted veil often projected onto the natural world. He stresses that extreme behaviour such as self-sacrifice, which we might label as an act of love or sympathy, has a different explanation if observed from the perspective of the gene:

“We all grew up,” said John Ottokar the Quaker, “with the image of the mother-skylark, pretending to drag a wounded wing to draw away the hunter. We were told, this showed that *love*, and *altruism*, were *part of the natural world* –”

“According to the maths of all this” said Luk, “which you understand better than I do – this is simply a case of the odds on protecting more of her genes by self-sacrifice. According to this statistical view of love, of course, perfect love wouldn't be mother-love. It would be – it could only be – monozygotic twins. Clones, like my black slugs.”

“A monozygote,” said John Ottokar slowly, “is its twin's mother and sibling. Parthenogenesis after sexual propagation.”

Luk was about to embark on a complicated exegesis of kin-theory when he realised that for John, the problem of monozygotes was personal.’ (214, emphasis mine)

Peacock thinks that identical twins represent ‘perfect love’. Monozygotic twins share almost exactly the same genetic make up. Consequently, they are, in the light of evolutionary biology, particularly prone to favour the other. This is a broad application of ‘kin-theory’, as Peacock puts it, referring to theory of kin selection.

The theory of kin selection was elaborated by evolutionary biologists and aims to explain why, in a ‘red in tooth and claw’ natural world, an organism would risk its life or wellbeing to save a relative. Early descriptions of the kin selection theory were developed by R.A. Fisher in 1930 and J.B.S. Haldane in 1955. However, it was W. D. Hamilton the scholar who actually established the concept in two articles published in 1963 and 1964. The biologist John Maynard Smith, in turn, coined the phrase ‘kin selection’ in a paper published in *Nature* in 1964. In the paper, he wrote: ‘[b]y kin selection I mean the evolution of characteristics which favour the survival of close relatives of the affected individual, by processes which do not require any discontinuities in the population breeding structure’ (Smith 1964: 1145). Ever since Darwin himself first posed the question, the theoretical problem of altruism in evolution has been addressed in ethology, sociobiology, behavioural biology and evolutionary psychology studies – and a hot debate on the subject is still going on today (Waal 2010).

In Ottokar’s perspective, exceptionalism is under threat when socially highly regarded forms of human behaviour – such as love and altruism – are reducible to genetic mechanisms. The supremacy of genes over the individual deeply saddens John Ottokar for he would prefer to believe in altruism in a genuine and disinterested way. This is underlined by Ottokar’s description of genetic studies as ‘terrible’ and ‘soul-destroying’ (340). The character believes in the scientific explanation Peacock provided him with, but he would prefer that it was false. This sense of hopelessness will eventually lead him to join a suspicious commune-religious cult with his brother. These fanatic activities will end in conflagration and suffering.

John Ottokar’s description of genetic studies as ‘soul-destroying’ is comparable to some responses to the most popular of the gene-centric texts, *The*

*Selfish Gene* (Dawkins 2006: xiii). In the preface of *Unweaving the Rainbow*, Dawkins writes:

‘A foreign publisher of my first book confessed that he could not sleep for three nights after reading it, so troubled was he by what he saw as its cold, bleak message. Others have asked me how I can bear to get up in the mornings. A teacher from a distant country wrote me reproachfully that a pupil had come to him in tears after reading the same book, because it had persuaded her that life was empty and purposeless’ (Dawkins 1998: xi).

Dawkins also mentions in the introduction to the 30<sup>th</sup> anniversary edition of *The Selfish Gene* another accusatory response to the book, this time a letter from a reader in Australia: ‘I largely blame *The Selfish Gene* for a series of bouts of depression I suffered from for more than a decade’ (2006: xiii). There is no apparent difference between these responses and John Ottokar’s one. Even though *The Selfish Gene* was not published by the time the character Luk Peacock was researching on sex and altruism, we should note that the gene’s eye view of Darwinism was implicit in the writings of Fisher, in the early 1930s, and made explicit in those of George Williams and W.D. Hamilton in the 1960s.

W.D. Hamilton himself tried to overlook the idea that human behaviour could be illustrated by his own theory. Hamilton writes in the introduction of the first volume of *Narrow Roads of Gene Land*:

‘Doubtless I was seeing these problems from a somewhat different perspective when I was twenty-seven, but one thing has not changed – this is my dislike for the idea that my own behaviour or behaviour of my friends illustrates my own theory of sociality or any other. I like always to imagine that I and we are above all that, subject to far more mysterious laws. In this prejudice, however, I seem, rather sadly, to have been losing more ground than I gain. The theory that I outline in the paper has turned out very successful. It certainly illuminates not only animal behaviour but, to some extent as yet unknown but now being actively researched, human behaviour as well’ (1996: 2).



In *The Origins of Virtue*, Matt Ridley also addresses the discomfort that ‘this revolution in biology’ provoked in those who became familiar with the emerging scientific truths. As Ridley puts it:

‘The mental impact of this revolution in biology for those close to it was dramatic. Like Copernicus and Darwin, Williams and Hamilton dealt a humiliating blow to human self-importance. Not only was the human being just another animal, but it was also the disposable plaything and tool of a committee of self-interested genes.’ (Ridley 1997: 19)

Somewhat like Hamilton, but in a more profound way, John Ottokar dislikes the fact that his current job is precisely, through his mathematical skills, to help to a better understanding of sex and altruism in organisms using a gene-centred perspective. As the character explains to Frederica Potter, then his girlfriend:

‘He [John Ottokar] had wanted to be – he said, his language faltering – an individual in an ordinary world – and she [Frederica Potter] was the way, she must not let him go. He had tried to – to keep steady through work – but work was full of terrible things, it was soul-destroying. *I work to prove the individual is nothing, said John Ottokar, eloquently. . . . I want you to marry me, said John Ottokar, and we will make a good home for Leo.*’ (340, emphasis mine)

It is also interesting to note that John Ottokar proposes to Frederica right after confiding to her his disgust about gene-centred theories. The mathematician wants not only to marry Frederica but also to take care of Leo, Frederica’s only child from a previous relationship. In so doing, John seems to be trying to reassert his individuality and moral freedom, since he demonstrates willingness to invest his time and energy in raising a stepson (i.e. a child who does not bear half of his genes). Despite this, Frederica declines the proposal. As a female, she is entitled to choose her mate and she picks Peacock, who seduces Frederica by discussing Darwin’s aversion of the notion of the seemingly useless peacock tail. This allusion to the theory of sexual selection is another example of a naturalistic way of interpreting human behaviour in *A Whistling Woman*.

Readers of *A Whistling Woman* have access to Luk Peacock's perspective about John's opinions on their scientific research. As Peacock tells Frederica: '[h]e [John] doesn't like my research. He doesn't like the idea – from the religious point of view – that what we call altruism is a kind of machinery of self-propagative interest' (335). Peacock's argument echoes the dominant ideas among biologists in the 1960s, as Matt Ridley puts it:

'Biologists discovered nepotism and reciprocity in the 1960s because they caught the self-interest virus. They suddenly started asking, about everything that had evolved, 'But what's in it for the individual?' Not the species, or the group – the individual. Such a question led them to a fascination with animal cooperation and hence to the central importance of the gene. Behaviour that is not in the interest of the individual might be in the interest of its genes. Material self-interest or genes became the watchword of biology.' (Ridley 1997: 131)

A dialogue between John Ottokar and Luk Peacock is revealing of how strongly ideas of genetic determinism disturb the identical twin. In the excerpt below, we can not only have a sense of John's hopelessness regarding those ideas, but also see that he recognizes them as scientific truths. As the character puts it to the geneticist:

'I've [John Ottokar] been thinking. We're some kind of clone. Or some sort of virgin birth, one from another, dunno which dunno if scientists could find out. *All your stuff's been making me think.* I never really did much biology, only maths and computers. I worked on where oil tankers ought to go. *What you've worked out is an explanation of everything. From the point of view of cells and organisms. Makes all sorts of ideas meaningless. Kindness, love. God. . . . It's like a ghastly Fate. . . .* There isn't really any Fate, of course, or any sort of – sort of – watching over us. *There's just genes, as you keep saying.* I'm really glad,' he said, with a useless attempt at irony, 'that you get so much pleasure from all these ideas. I don't. *I see they're right but they just take away the meaning. And they don't change the fact that he [Ottokar's twin]'s my fate, because he's*

*my genes. We're interchangeable and dispensable.*' (322-3, emphasis mine)

John Ottokar rationally agrees with this view of the world through the lens of genetics ('I see they're right') but he claims that it just takes 'away all the meaning'. What Byatt is exploring here is the tension between a humanist and a naturalistic view of human beings.

An individual may be ready to stand up for a brother because he is the person one has grown up with, because siblings are uniquely able to understand each other. For this person, who bears such unique features, an individual is ready to put life in risk. It is culturally perceived as reassuring to believe that this is because of the intangible bonds of love that unite siblings. One might not be prepared to accept that the readiness to save a brother's life can be reduced to the fact that siblings share the same genes. This is what happens with John Ottokar, whose intuitive understanding of familial relations is disturbed by a gene-centred perspective that, after all, he does recognize as a scientific truth.

John Ottokar objects to Peacock's ideas on kin selection and altruism not because they are mathematically wrong, but rather because, in his opinion, they empty human relations of their meaning. As an identical twin, John's perspective of this problem becomes even more dramatic. Since he and his twin brother share nearly the same genetic make up, they are 'interchangeable and dispensable' (333) in the light of the evolutionary biology.

In the end of the novel, John Ottokar risks his life to save the sibling he described, a few chapters earlier, as his 'fate' because he is his 'genes'. John and Paul Ottokar's outcomes could suggest that, as established in kin selection theory, a twin will instinctively attempt to save his or her sibling. But it is equally arguable that the drive to save a twin brother is culturally derived – after all, both have been raised together and developed a very close relationship. It becomes clear that what Byatt does in *A Whistling Woman* is not to buttress the ideology of genetic determinism (of which she appears to be an advocate, since she has 'been excited by the rigorous arguments in favour of nature', ASB, 82). Rather, the author is interested in exploring the implications of the belief that human ethics and morals can be placed on a scientific basis.

## Conclusion

I began this chapter by mentioning Byatt's conviction that books like Richard Dawkins's *The Selfish Gene* and Matt Ridley's *The Origins of Virtue* helped to push Darwinian arguments into the fields of ethics and politics. She believes that these 'profound changes' should inevitably alter the form as well as the subjects of fiction. *A Whistling Woman* itself is an example of these changes: the novel presents dialogues in which the relationship between human morals and genetics are discussed from different points of view. Its polyvocal form also contributes to the attempt of granting readers access to multiple subjectivities.

Visions of human nature are influenced by gene-centred discourses; hence the importance of fictional accounts that explore the consequences of these changes. *A Whistling Woman* explores the psychological implications of genetic determinism. As it is shown in the last section of this chapter, the impact of scientific ideas can be other than responses of trust or disbelief. What Byatt does in her novel is to test the impact of ideas coming from evolutionary biology in a character (John Ottokar) that, as an identical twin, and also as an intellectually curious individual, will set these biological explanations against the backdrop of his own life. For John Ottokar, there seems to be a profound nihilism in a world where kindness and love can be *explained* by the interactions between genes, cells and organisms. Ottokar does not say that those scientific ideas are wrong, he limits himself to state that, if so, much of the values of our society become 'meaningless'.

Byatt's explorations of human nature in *A Whistling Woman* are put forward by characters representing different models of humanity that were being negotiated in the late 1960s. The characters who have inquiring minds and drive their lives using reason tend to have more promising outcomes than those who are violent or fanatic. Religious extremists and dilettantes have not auspicious outcomes. Science and other rational forms of human knowledge are portrayed as defining human cultural systems – and, as such, they are to be cherished and preserved.

*A Whistling Woman* is an example of how scientific truths – in this case emerging from sociobiology and other gene-centred disciplines – can be explored in the contemporary novel. Byatt's personal view of humans does not clearly emerge from *A Whistling Woman*. This fact is not unrelated to the multiplicity of plots and

characters, whose purpose is appraisal of a polyvocal narrative. *A Whistling Woman* comprises nearly sixty characters and a dozen plots. As a novel of ideas, *A Whistling Woman* aggregates so many threads that the reader may have difficulty in following and interrelating them all. Nevertheless, the discussion about the notion that human morality and ethics are biological products holds considerable importance throughout the plot.

On the other hand, it can be argued that it is precisely the profusion of perspectives and plots that allows ideas emerging from evolutionary biology to be discussed from different points of view. In so doing, Byatt rehearses verisimilar discussions between scientists or scholars inhabiting academic spaces in the late 1960s. This literary device grants the reader access to a great number of subjectivities and systems of thoughts. In that way, Byatt portrays different attempts to reconfigure views of human nature in the 1960s.

## Chapter eight

### Carole Cadwalladr's *The Family Tree*

*The Family Tree*, Carole Cadwalladr's first novel, can be described as a contemporary dialogue about human nature. In this chapter, I argue that popular science books helped to shape the novel, or at least the way the human nature debate is framed in it. I show how Cadwalladr resorted to genetic and evolutionary accounts of human nature with a pragmatic sense of usefulness: the novelist needed a "theoretical framework" (CC, 119) for her novel and she found one in genetics. In what follows, I analyse why those disciplines emerged as a convenient solution to Cadwalladr's literary project.

Carole Cadwalladr wanted her first novel, *The Family Tree*, to be a book about "everyone's family" (CC, 118-9). While writing the manuscript, she realised that the novel needed something as a varnish, an external layer which could add value to an old literary theme: families. She found this in popular science books about genetics and evolution. The novelist found there an "extra-layer" that could give strength to her story:

"I wanted this sort of, this extra-layer which, you know, which created a thicker fabric for the rest of the novel. . . . Now, thinking about all that, I think I have this very vague idea about . . . is it nature, is it nurture, genes? And I tripped over a book; I think I've had it on my bookshelf for years, *The Selfish Gene*, by [Richard] Dawkins." (CC, 130-5)

The novelist felt that her book would be useless if it did not take the explorations of families and human nature to a different level. As such, Cadwalladr decided to turn to science: "[d]oes the world need one more novel? The science became quite a missionary [thing] to me, because I did want this novel to add something" (CC, 951-2). She thinks that literature is being gradually neglected in the discussion of the "big questions" of human nature and, to some extent, this is why literature now focuses so often on science. "I think we are kind of grasping for

credibility” (CC, 956). In that context, scientists are perceived as those who are not only “asking the fundamental questions, philosophical questions” (CC, 944-5), but also those who “are coming out with some of the answers” (CC, 957).

While researching for the novel, Cadwalladr read many texts on evolutionary biology. In the last pages of *The Family Tree*, we can find a selected bibliography including authors such as Richard Dawkins, Steve Jones, Steven Pinker, Matt Ridley, Susan Blackmore and Steven Rose. Without these accessible accounts on genetics and evolutionary psychology, she claims that it would have been difficult to embed scientific ideas in the novel. Cadwalladr regards herself as a scientific illiterate, an individual who comes “from this completely ignorant angle” (CC, 886). As she puts it:

“I was getting my science from popular science, I wasn’t getting it from reading the actual... you know, reading the papers, I would have to have a mediator so that I could understand it, you know, not coming from a scientific background.” (CC, 359-62)

Cadwalladr suspects that *The Selfish Gene* was the first thing she read on the subject, but she is not completely sure. Perhaps she had read a Matt Ridley book “a few years before” (CC, 137). Steven Pinker’s 2002 book, *The Blank Slate – The Modern Denial of Human Nature*, is mentioned by Cadwalladr as highly influential. The novelist traces her experience with this book to a public event in which Steven Pinker was on the stage. As Cadwalladr – then a novelist-to-be interested in genetics – recalls it:

“And then *the real turning point* was that talk I went to in... hum, somewhere in London, and it was Ian McEwan in conversation with Steven Pinker. And I think I already had started reading then... the Steve Pinker’s book. . . . *The Blank Slate*, yes. Or maybe I started reading the book after the talk or whatever. But when I got to it I found it so interesting. And it’s great because, you know, at that point I was stuck on my novel. So I read it and from the start *it gave me lots of ideas*. And also I just thought, oh, what a great character. I thought... [laughter] that Steven Pinker was a sort of great character” (CC, 138-153, emphasis

mine)

Cadwalladr was then “stuck on” her novel and Pinker’s exploration on human nature proved to be inspiring, giving her “lots of ideas” on how to structure her literary project on families, inheritance and human nature. The public event mentioned by Cadwalladr, in which Pinker shared the stage with the novelist Ian McEwan, was possibly a symposium on Literature, Science and Human Nature. This event was held at the Institute of Contemporary Arts in London, in May 2004, and organized by the University of Surrey. Papers delivered during the meeting were published in a book (Wells & McFadden 2006).

It is interesting to ponder why genetics and evolution emerged as a solution to Cadwalladr’s project. We have seen that Cadwalladr was looking for a theoretical framework for a novel about families and the major themes that his subject evokes – for instance, inheritance, resemblance, marriage and adultery. These themes are often addressed in evolutionary psychology books and this may be part of the explanation. But Cadwalladr’s choice, I suspect, cannot be understood apart from the context in which these evolutionary accounts thrive. Cadwalladr’s option for a scientific framework occurs in an environment in which popular science books, and the activities of their authors, are considered as fashionable and of commercial interest (Rodgers 1992).

Evolutionary psychology authors were part of the boom in popular science during the 1990s, benefitting from mass media visibility. Their influence may be understood as part of an unusual case of science in the media (Cassidy 2005). Press coverage of evolutionary psychology was found to be closely linked to popular books on the subject. UK media outlets steadily report on their books and appearances in public lectures or debates. This presence in a wide variety of elite media forms suggests that evolutionary psychology authors became a recognized part of the mainstream intellectual culture in the UK.

Why would evolutionary psychology be an inspiring and useful literary framework? Evolutionary psychology is perceived by Cadwalladr as a discipline which could, with an alleged scientific basis, provide a meaningful argument about the human condition and family connectedness. In another interview, Cadwalladr emphasizes the desire for a scientific framework – and possibly for a plot of commercial interest – in similar terms as in my interview:



‘I wanted it [the novel] in some way to be about all families. And it was then that I discovered on my bookshelf *The Selfish Gene* by Richard Dawkins. I must have bought it 10 or so years ago and it has languished there unread ever since. I finally got around to reading it and found it eye-poppingly illuminating. When thinking about families, we all, maybe unconsciously, think about genes – about which bits of what we’ve inherited from whom; about why we are the way we are. And it was then that I realized that genetics could provide me with a framework on which to hang the novel. I went and raided the popular science section of my local bookshop and was hooked. I had no idea that the questions and dilemmas I was posing were also being tackled by people altogether better qualified to be able to answer them: scientists. . . . The so-called new sciences of human nature are attempting to answer questions that philosophers have grappled with for centuries: what is it to be human, what makes us who we are’ (BookBrowse n.d.).

Cadwalladr repeats here the idea that genetics provided her with ‘a framework on which to hang the novel’, but also reinforces the notion that she is part of an ignorant group on which scientists are kind enough to shed their wisdom. Scientists researching on genetics and evolution address human nature in a way that she perceives as ‘better qualified’. In other words, Cadwalladr positions herself (and all non-scientists) intellectually below scientists in terms of ability to investigate human nature.

In what follows, I will show how Cadwalladr found in genetics and evolution a source of inspiration for a specific character in *The Family Tree*. The behavioural scientist who is married to Rebecca, the narrator and main character, was based on the cognitive scientist Steven Pinker.

### **Steven Pinker turned into a character**

The American linguist and cognitive scientist Steven Pinker plays an important role in the making of *The Family Tree*. And this is not only because he is involved in what

Cadwalladr considers “the real turning point” in her novel, which is the decision to use genetics as a framework to enrich her literary material. Cadwalladr drew on Steven Pinker to construct her character Alistair Betterton, a behavioural geneticist who the novelist herself describes as “dark and arrogant” (CC, 177).

Alistair Betterton is a behavioural geneticist who believes that fate is another word for genetic predisposition. He ‘measures heritability’ (131), and ‘identical twins reared apart used to be his specialist subject’ (131). He claims to be better positioned to unveil the human condition as it is ‘inside our cells [that] are answers to questions that philosophers and writers have been asking for hundreds of years’: ‘[w]hat is human nature? What is innate?’ (154). By contrast, his wife Rebecca thinks that people are formed by the times in which they live.

Cadwalladr thinks that Alastair is an interesting character precisely because he believes he has all the answers, becoming thus a “religion substitute”. In the excerpt below, we can note how Cadwalladr’s reverence towards science can be articulated with a critical response to it:

“Alastair is an attractive character in his arrogant way, he is always lecturing people. In a sense, people who claim to have the answers, they all became post-modern priests in a way – and they’re atheists. I mean, when I was young... I really had this awe for – this is my personal journey, but anyway – for those types. God, I know nothing, like... you know, all I know is rubbish, it’s crap. And then they have all those theories and they know, they know! They kind of have the answer to the Universe in them, you know, and... What does that say? I think there are kind of parallels with this sort of religion substitute. . . . I mean, look at Dawkins; he is the oddest.” (CC, 543-54)

The character Alistair is described as someone with a “cultivated personality . . . [who] loves to be in the media” (CC, 166-7). In *The Family Tree*, the character is introduced to the reader as an ‘expert’ who appears often on television shows. He has published a popular book called ‘Destiny’s Child: Nature versus Nurture in the Age of the Genome’ (9). Alistair seems to be as popular as Steven Pinker himself, who was portrayed in *The New York Times* as ‘a media star throughout the English speaking world’ (Aronoff 1999). They have in common the fact that both are scientists working

on human behaviour and both are established science communicators. They are also happy about their childless condition, despite the fact that they believe humans are genetic machines programmed to pass their genes on. When Alistair is interviewed by Jeremy Paxman on *Newsnight* programme, he explains his childlessness in a way very much similar to that adopted both by Steven Pinker in *How the Mind Works* and by Richard Dawkins in *The Selfish Gene*:

‘The imperative of your genes is to go and propagate, to guarantee their immortality in the next generation. But we are rational, reasoning human beings, with enormous brains capable of complex thought. If your genes controlled you, you would go out and try to have sex with as many women as you could. You would father a thousand children. But we have free will. We commit ourselves to one partner. We have contraception. *We are vehicles of our genes* but we are not impelled to drive them forth into the next generation. And *if your genes don't like it, well, that's just tough luck.*’ (189, emphasis mine)

In the book *How the Mind Works*, Pinker explains that the drive for reproductive fitness will not prevail in post-industrial times simply because natural selection favoured it. Pinker argues that, in this respect, he is a failed Darwinian as he had neglected ‘the solemn imperative’ to spread his genes (Pinker 1998). This is a famous quote which has been reproduced in book reviews, for instance (Ridley 1997). Pinker claims to be happy about his childless condition, arguing that if his genes are not, they can always ‘go jump in the lake’. That line was Cadwalladr’s source of inspiration: in an act of parody, she transformed Pinker’s ‘genes go jump in the lake’ in Alistair’s ‘that’s just genes’ tough luck’.

Alistair’s position resembles that of Richard Dawkins’s. The idea that humans are mere vehicles of their genes was put forward by Dawkins in *The Selfish Gene* (Dawkins 2006 [1976]). Cadwalladr agrees with this comparison (“Alastair is much closer to Dawkins”, CC, 182), even though she claims that, at least consciously, she drew inspiration from Pinker to construct the character. “I think he [Pinker] is the starting point for the character, when I arrived at that talk” (CC, 207-8).

Cadwalladr did not hide from Pinker her source of inspiration (“He knew that, I confessed that”, CC, 262). She thinks Pinker regarded positively the fact that some

of his ideas and personality traits were turned into a novel. “I think he was quite flattered about the idea that he was the inspiration for the character” (CC, 257-8). In Cadwalladr’s view, Pinker’s amusement is related to the fact that, in becoming part of a literary project, his ideas could be conveyed to a more artistic readership. “I think he got a bit of a kick out of it, you know, his ideas were being sent to a completely different audience” (CC, 263-4).

Steven Pinker was turned not only into “a good character” (167) but also into a helpful reader of Cadwalladr’s manuscript. Pinker “read the proof version” (CC, 212) of *The Family Tree* and gave the American publishers of the novel “an extended quote” (CC, 212-3) to be published on the back cover. “He gave me a great quote”, says Cadwalladr (CC, 213). This makes us aware that the current proximity between scientists and novelists is motivated not only by intellectual reasons but also commercial interests. Pinker also suggested corrections so that the content of the book was scientifically accurate. “He read the proof and he did call me up in a couple of minor things, I think. It gives me much more confidence. It was really terrific” (CC, 309-11).

*The Family Tree* was also recommended by Pinker in an article in *The Guardian*. He mentioned there that the novel is an example of ‘cognitive science fiction’. As he puts it, this genre could be defined in the following way:

‘[N]ovels in which one character is a cognitive scientist caught up in great themes of literature which are also themes of the sciences of mind, such as reason, emotion, free will, love, hate, consciousness, memory’ (Pinker 2004).

Pinker summarizes Cadwalladr’s novel as the story of ‘a young woman . . . married to a behavioural geneticist who is a constant reminder that she risks inheriting her family’s dysfunctionality’ (Pinker 2004). Pinker’s synopsis emphasises Rebecca’s risk of inheriting ‘her family’s dysfunctionality’, but neglects the core theme of the novel: a dialogue between different points of views on human nature. In the next section of this chapter, I look at some examples of how the struggle between contradictory portraits of the human condition is explored in *The Family Tree*.

## Anxieties about genetic influence

It would be reductive to say that the character Alistair is a constant reminder of Rebecca's family legacy – he is a constant reminder of the workings of human inheritance in general. Rebecca's musings regarding genetic explanations of human nature are, therefore, a narrative solution that allows readers to have access to conflicting views of humans. By the end of the novel, no definite answer regarding the role genes play in human nature is provided.

In *The Family Tree*, the reader is often confronted with episodes that can have either cultural or genetic explanations. A good example of different perspectives on the same subject is Rebecca's fears of inheriting the mental illnesses that affect her female lineage. Her mother suffered from bipolar disease, having committed suicide during a family gathering; her grandmother was diagnosed with Alzheimer's. When Rebecca discovers that the study in which she is taking part – research conducted in Alistair's laboratory – is, after all, about a suspected link between bipolar disease and Alzheimer's, she naturally considers to be at risk of developing one of these illnesses. However, when her aunt Suzanne reveals that her mother became 'less stable' after learning that her own mother had had an affair, Rebecca thinks that her mother's disease may not be genetic. As it is described in *The Family Tree*:

“She [Doreen, Rebecca's mother] had a breakdown. When we were children. And it all came out. Your mother took it very badly. . . . It affected her, I think,” says Suzanne eventually. ‘She never really trusted Alicia [Rebecca's grandmother] after that. She wouldn't let her mother her. She was... less stable somehow, afterwards.’ . . .

‘So Alistair's wrong then,’ I say. ‘It's nurture. Not nature.’

She pauses and then sighs. ‘You know, Rebecca, I don't really think it's a question of right and wrong. Life happens. And you get on and deal with it.’ (364)

Rebecca's ending in *The Family Tree* is not promising: she discovers that Alistair has fallen in love with an undergraduate student, and as a result they get divorced. At the same time, her grandmother dies as a consequence of Alzheimer's disease. In some respects, the main character is described as being driven by biology,

as if human innate dispositions had power over one's destiny. Rebecca feels uneasy about her pregnancy, deciding to keep the embryo even though she 'almost consigned her [the baby] to an NHS bin bag' (381). Rebecca's perception of her decision is that she has lost agency: '[i]t feels as if I'm being overtaken by something else. As if I'm part of a single mononuclear organism that wants its own kind to propagate, no matter what' (369).

One could interpret Rebecca's outcome in a genetic deterministic way. But the novel equally gives readers reasons to interpret it differently. Let us look at another example. Rebecca appears unstable at the end of the novel, behaving either euphorically or depressively. Is it an early symptom of bipolar disorder? Did she inherit it from her mother? Or is it a normal behaviour of someone who has just got a divorce letter and buried her beloved grandmother? All possibilities are plausible as Cadwalladr wanted the novel to be inconclusive. In other words, she wanted the novel to mirror her own perception about the human nature debate. As she explained in an article in *The Observer*:

'. . . the central question to the book is whether you are the way you are because of your genes, your upbringing, your subsequent experiences or because you spent too many childhood hours watching serial American dramas . . . I have no answer. I don't know why I am the way I am.'  
(Cadwalladr 2005)

Cadwalladr's position in the nature and nurture debate is precisely the 'middle ground' that Pinker abhors (Pinker 2002: xiii). Her opinion is that the truth might lie somewhere between extreme positions: "[w]e don't think that it's all environment" (CC, 1136); "[w]e came to see that it's neither nature nor nurture these days, don't we?" (CC, 1180-1). When asked about how she would position herself in the debate, her answer was candid: "I don't know" (CC, 1166).

### **Science as 'proper academic work'**

Alistair is described by Cadwalladr as a "pedagogic character" (CC, 322) and in fact he is the narrative tool that allows the author to embed scientific ideas in the narrative.

Cadwalladr acknowledges that the fact that he is always explaining things to Rebecca is “a sort of naïve device” to convey this information to the readers (CC, 327). The novelist also suspects that “that’s part of the reason why that character is like that” (CC, 327-8), pedagogic and always “lecturing” Rebecca.

The narrative solution was chosen “partly” because Cadwalladr believes she does not “have the intellectual ability . . . to understand the complex” (CC, 357-8). As such, the novelist felt compelled to build a scientist character explaining “the complex” to another character with less “intellectual ability”. What is ironical in this explanation is that it was Cadwalladr who created both fictional voices, thus being responsible for imagining plausible dialogues on complex ideas. Cadwalladr’s tendency to position herself intellectually below scientists is relevant. It reinforces the idea that those who are now entitled to analyse human nature are the scientists.

Cadwalladr’s reverence does not stop her from questioning scientific authority in her discourse. In *The Family Tree*, however, scientific authority is not overtly challenged. The narrator shares the questioning of scientific truths only with the implied audience. Cadwalladr uses the characters of Alistair and Rebecca as a conversing couple whose dialogue serves to transform complex concepts into simple ideas. The science communication approach reproduced *within* the narrative is therefore a ‘deficit model’ (Wynne 1992): Alistair the scientist explains to Rebecca the ignorant what science can tell us about human nature.

‘In all the twin tests ever done into intelligence and personality, the results are roughly the same. There is almost nothing to distinguish twins brought up together from twins brought up apart, i.e. the environment has almost no effect.

‘Don’t you get it?’ said Alistair when I failed to be overwhelmed by this. .

. .

‘It goes against every parenting book ever written. Whatever you do, as a parent, in practical terms, makes no difference.’

‘How would you know?’ I said. . . .

‘That’s the thing, this isn’t a hypothesis. It’s empirically proven. As a parent, it doesn’t matter what you do, whether you read to your children, or don’t read to them; take them to the circus, make them listen to Beethoven, whatever. At the end of the day, it makes no difference. Not to

their personality, not to their intelligence. Not even to their happiness.’ . . . I think Alistair enjoys these discussions. *My role is to be the uninformed public* . . . I rarely manage to score a point over him *because he can always trump me with scientific knowledge. He knows more than I do. More facts anyway.*’ (132, emphasis mine)

Rebecca tries to question Alistair’s tendency to locate human behaviour solely in the realm of natural sciences. But her narrating voice lacks the sharpness of a real intellectual debate. She intimately disagrees with much of his arguments but does not really engage in a debate with him. Her response seems to be mute and inadequate.

Cadwalladr dislikes academic jargon and, therefore, her objective in *The Family Tree* is to “communicate very simple . . . ideas about life and relationships that you actually could be reading in a woman’s magazine” (CC, 365-7). Cadwalladr wants to eliminate academic jargon but her desire is valid only to the language of the natural sciences. Footnotes and other references from Rebecca’s PhD thesis in cultural studies are recurrently included in the novel – and this information should be considered jargon too.<sup>22</sup> Cadwalladr’s explanation for this is that the academic language from social sciences produces, in the context of *The Family Tree*, a humorous response:

“But then, on the other hand, using things like footnotes was a good idea. I like using Rebecca’s academic language, the way she talks about cultural and sociological things and I don’t dislike it... I find it funny... so I like the idea of having that.” (CC, 367-9)

What seems to be at stake here is the classic opposition between the natural sciences and the humanities. In *The Family Tree*, Cadwalladr portrays cultural studies as something that “can be looked down on” (CC, 405) by scientists who believe that *they* do serious research. As Cadwalladr puts it: “I just like the idea of him [Alistair] being so disdainful, that *he* was doing proper academic work” (CC, 405-6). Although Cadwalladr critically portrays the tension between both fields, she considers that

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<sup>22</sup> Rebecca’s thesis is about ‘the discourses of post-sexual-revolution Britain; the impact of Americanization from 1945 to present day; the interplay of private lives and dominant culture’ (377-8) – in short, it is a dissertation about *Dallas*, as the narrator puts it.



scientists are the ones ‘better qualified’ to produce theories about human nature.

Considering that Alistair was based on Steven Pinker, it is interesting to note that Alistair is a behavioural geneticist and not exactly an evolutionary psychologist. Even though Alistair’s discourse is permeated by evolutionary tales, his theories can be tested in twin studies, for example, while there are arguments advocated by evolutionary psychology that cannot be empirically tested. The opposition created between Alistair’s and Rebecca’s areas of expertise, in Cadwalladr’s words, lies in the fact that cultural studies theories cannot be tested as Alistair’s subjects of study can. As Cadwalladr puts it:

“there is something else that juxtaposes Rebecca and Alistair, it is that she’s studying . . . popular culture. . . it’s so impossible to comprehend beyond confusion; it’s all theory, theory, theory. Whereas in Alistair’s science... you can test something, hypothesis, you can have something, you have some sort of concrete answer. . . . So, in practical terms, science isn’t as post-modernist research, it’s mechanized; it can be something that can shake the universe and that can hand all the connections on it. *And that’s the kind of character Alastair is, he has the one overriding theory, he can explain the Universe, whereas Rebecca hangs around in a post-modernist world where ... you know, it could be the science or it could be the environment or it could be things on the telly or it could be . . . Well, I don’t know.*” (CC, 513-26, emphasis mine)

Cadwalladr’s argument suggests that the scientific framework she was looking for in genetics consisted in its ability to provide “an overriding theory” that could be tested and, herewith, provide “some sort of concrete answer”. What the novelist perceives as positive in Alistair’s science is that it claims to have answers in times of uncertainty. Ironically, this “concrete answer” has not fully convinced Cadwalladr herself on the human nature debate.

## **Conclusion**

Carole Cadwalladr’s relationship with scientific authority is an ambiguous one. In

many ways, the novelist draws on a 'deficit model' wherein scientists bemoan the public's ignorance. Because Cadwalladr regards herself as someone scientifically ignorant, she uses a professional character to embed scientific ideas in her novel. In *The Family Tree*, the scientist character 'trumps' the 'uninformed public' with 'scientific facts'. This is the literary device chosen to convey and simplify what she perceives as "complex ideas". Cadwalladr's tendency to position lay people intellectually below scientists reinforces the notion that those who are entitled to explain human nature are the scientists. In her opinion, the disciplines which are now providing a better understanding of the human condition are the natural sciences.

On the other hand, Cadwalladr's reverence towards scientists does not stop her from adopting a critical approach. The scientist character portrayed in *The Family Tree* is described as an arrogant and self-centred man. Cadwalladr acknowledged that this character was based on Steven Pinker and that, to some extent, it is also reminiscent of Richard Dawkins. Regarding the discourse of evolutionary psychology, the novelist believes that it became a sort of "religion substitute" precisely because it attempts to provide all the answers. Here we arrive at a paradox. Cadwalladr decided to incorporate scientific ideas in her novel because she believes they provide answers about the human condition. But Cadwalladr regards those very scientific ideas as a "religion substitute" when they are presented as the repository of all answers. A possible explanation for such a contradiction is the popular appeal associated with genetic and evolutionary stories of human nature. These accounts provided a "theoretical framework" onto which Cadwalladr could hang the novel. In other words, science provided a coherent structure for the story, conveniently fulfilling her literary needs.

## Chapter nine

### David Mitchell's *Cloud Atlas*

The novel *Cloud Atlas* comprises six independent but interconnected narratives. Marshalled in chronological order, these narratives develop respectively in the 1850s, 1930s, 1970s, 1980s, 2300s and, finally, in a post-apocalyptic future when savagery rules and the notion of civilization and progress failed. In *Cloud Atlas*, the course of history reveals moral collapse and social decay, suggesting that human beings are essentially tyrannical or violent. In this chapter, I show how the use of genomic manipulation as a political instrument is just another form of 'dehumanization to legitimize exploitation' (DM, 69) in David Mitchell's literary project.

My argument is that the novel explores the notion that violence and exploitation are part of human nature. In that context, genetic engineering is presented as the ultimate form of exploiting individuals. This objectification of humans represents the culmination of a historical and political process that places science, technology and consumerism as the driving forces of progress. In the novel, it leads to the fall of civilization and to a primitive and desolate existence. At stake is not only an allusion to the predatory nature of humans – a critical one, as I will show in this chapter – but also the notion that consumer societies are doomed to the consumption of themselves (Denes 2004, Klein 2001).

The fifth section of *Cloud Atlas* – entitled 'An Orison of Somni~451' – presents us Nea So Copros, a future world where living beings are presented as malleable, plastic creatures. Individuals can be 'genomed out' (214) and, most importantly, 'genomed for' (237). Humanness and bodily traits can be psychobiochemically fabricated or suppressed according to the market interests. Individuals are designed with a clear and irrevocable purpose, thus enjoying very little freedom. Genomic make ups define the strata one must dwell in in the society of Nea So Copros, where everything is politically negotiated at the molecular level. As Mitchell puts it, 'in Nea So Copros genomics is the science of keeping social contradictions and human unhappiness within operable limits' (DM, 50-2).

Even though I consider 'An Orison of Somni~451' in the context of the whole

novel, the focus of this chapter will be on this section. The others narratives do not include representations of modern genetics or biotechnology that would justify an exhaustive analysis. Nevertheless, it should be added that all sections of the novel consider human exploitation in many different forms, places and times (Norfolk 2004).

Whereas 'An Orison of Somni~451' presents a form of genetic subjugation, in the other stories we find representations of colonial, sexual, corporate and institutional violence or tyranny. In the first story, set in the 1850s, the young and naïve notary Adam trusts the notion of progress and regards subjugation in colonies with a degree of detachment. He is surrounded by violent episodes: from an act of sodomy against a cabin boy who later commits suicide to the enslavement and massacre of the Moriori people in Chatham Island. In the second story, we meet Robert Frobisher, an aspiring composer who offers himself to work as an amanuensis of a syphilitic and brilliant musician. Adopting a false identity, Frobisher uses his position to manipulate his boss and steal objects and compositions. The third story introduces readers to the journalist Luisa Rey and her investigation of a nuclear plant in the 1970s. In this narrative, not only is a young nuclear scientist named Isaac Sachs assassinated, but also, in an attempt to kill Luisa, the hired-assassin Bill Smoke effectively drives her off the road. As to the fourth story, it brings us the narrative of a publisher with a potential best-seller on his desk who ends up locked in an elderly nursing home against his will. The fifth and sixth stories, as mentioned, portray respectively the pre-execution testimony of an enslaved clone and the narrative of a tribesman (Zachry) after an extremely violent period of savagery, barbarism and rapes that led to the fall of civilization as we know it.

This chapter is divided into three parts. First, I discuss Mitchell's view about evolutionary accounts of human nature. The subsequent section is focused on the idea that, in *Cloud Atlas*, violence and exploitation are presented as part of the human condition. In the third part, I show how Mitchell is consciously writing about themes explored in fiction produced in pre-genetic times. It is clear in that final section that Mitchell's portrayal of genetics is less a response to contemporary popular science than a reinterpretation of classic works of fiction (such as Aldous Huxley's *Brave New World* and George Orwell's *1984*). Nevertheless, the idea of violence as inherent in the human condition is recurrent in evolutionary accounts of human nature.

## **Mitchell and evolutionary accounts of human nature**

Genetics appeals to a broad range of media – including literary novels – because it offers contributions to understanding the complex subjects of human motives. Gene-centred disciplines are about life and death, inheritance and family relationships, as well as uncertainty and plasticity. Mitchell's fascination with genetics lies in its ability to provide us with meaningful accounts of the human condition.

'How could the Lego of life not be fascinating?! It's our age's best answer to the eternal questions which literature exists to chew over: why we are who we are, and how we are what we are.' (DM, 213-5)

Mitchell's enthrallment with genetics does not entail an uncritical acceptance of contemporary ideas emerging from evolutionary psychology. He regards with a degree of suspicion the pervasiveness of Neo-Darwinian ideas in the dominant perception of human nature. According to Mitchell, evolutionary accounts of the human condition are understood as fashionable not because they are necessarily correct but mostly due to their explanatory power.

'There are times when I think the Neo-Darwinist gospel can make a pretty good job of explaining the whole caboodle – better than the Bible, say, or Freud – but then there are other times when the Museum of Creationism vs. Richard Dawkins / you're with me or you're against me dichotomy chafes, and Neo-Darwinism seems pervasive because it is fashionable, as psychoanalysis was not so very long ago. It fulfils the need to understand. At its most rigorous it tries to explain the human condition as empirically as it can, yes, and top marks for that – but there are times when it seems to have devised a system that cannot be wrong . . .

I'm not bright enough to be an answerer of the biggest questions, or even small ones, I'm only (if that is an 'only', but I don't even know that) bright enough to be an aspirant explorer – or ambling ponderer? – of questions.

Sometimes I even wonder if the human mind possesses an innate quality

we might call “innate resistance to full comprehension.” Often I hope so.’  
(DM, 102-24)

Mitchell believes that anchoring every feature of human nature in reproductive fitness ‘ends up being reductive’ (DM, 114). In this respect, Mitchell’s perspective is similar to that of Steve Jones, who believes that sociobiology is obsessed with sex. Using the survival of genes as an explanatory device, it is possible to find an evolutionary account for every human feature. It is possible but reductive. Within the frame of evolutionary psychology, for example, rape figures not as a product of culture or of a specific context but rather as a behaviour with evolutionary roots in the nature of men’s sexuality. Mitchell also finds inappropriate, for example, to find an evolutionary explanation for the fact that men are particularly keen on expensive cars. Such an association can be found in popular science books such as Ridley’s *Nature via Nurture*:

‘Genes as units of instinct? The concept has travelled far from Mendel’s hereditary particles. Confusion between many different conceptions of the gene has bedevilled the nature-nurture debate. You will no more find “advertise male quality to females” written into the SRY gene than you will find “advertise male wealth” written into the instruction manual of a Ferrari, but that does not mean it cannot be a valid interpretation of what each is for. Ferraris can be exquisite pieces of engineering at the same time as they can be sexual ornaments, and the same is true of genes.’  
(Ridley 2003: 241)

Mitchell believes that the approach of sociobiology and evolutionary psychology excludes other plausible explanations a priori.

‘I even read a piece the other day claiming that men’s fondness for big powerful cars is a Darwinian means of attracting a mate, and yes, I suppose it makes a sort of sense, but that ‘sort of’ ends up being reductive. It ends up negating the validity of alternative ideas which may, if pursued, prove more fruitful.

(Because the big powerful car’s driver’s dad was killed on his bike by a

monster-truck, or because he's watched so much "Top Gear" he's turned into a plonker.)' (DM, 111-19)

Mitchell's objection to reductive explanations of human behaviour suggests that the writer himself is not supportive of the idea that violence is rooted in human nature. Nevertheless, ideas related to exploitation, predatory behaviour and the struggle for survival are recurrent in *Cloud Atlas*. Mitchell's preoccupation with predation is a plot device rather than an expression of a personal view of the human condition. To Mitchell, 'no confrontation means no plot, and confrontation leads to dominance and subservience, victory or defeat, in one form or another' (DM, 128-9). Therefore, he thinks that violence and exploitation in *Cloud Atlas* should be interpreted as part of 'the artisanship of drama' (DM, 128) rather than the author's 'deep-seated Neo-Darwinist belief' (DM, 130).

### **Violence and human nature**

Nea So Copros is a society – geographically located in present Korea – where the moral compass taken for granted in contemporary Western societies gets disturbed by new forms of mastery over human lives. In this case, biotechnologies are used by authorities in order to maintain the status quo. Nea So Copros is divorced from the concept of freedom. As Mitchell describes it:

'Not much freedom in Nea So Copros, no. For the fabricants, there is none – they are deemed not to need freedom or have any rights to freedom. The very question "Why do fabricants need freedom?" would be a strange one – even a dangerous or heretical one. If the worker ants had the freedom to decide, "Y'know, I don't want to go to work today" or "I think I'll go and mosey around those pretty cornflowers and think about my purpose in the great chain of being" what would happen to the ant-hill? Destruction. Freedom is associated with a defunct system of statehood collectively known as The West which has been discredited by its own ecological self-poisoning, just as Communism is a discredited ideology for us. For the humans who are conceived and born with less

biochemical/genomic alteration, limited freedoms are granted. They can choose their profession, for example, provided their exam results allow it, and can choose who to marry and have children with, although birth-licenses must be obtained in the correct manner on pain of mandatory abortion.’ (DM, 25-38)

People in Nea So Copros do not see themselves as architects of their own destiny. They are objects rather than subjects – and it is the use of genomic science as a political instrument that puts them in that condition. This scenario is presented as the ultimate consequence of a long historical process in which technological control of nature is dangerously bound up with promises of increasing prosperity and productivity.

All human beings, including the cloned ones, are psycho-genomically altered to some extent. Humans and ‘fabricants’ have different degrees of freedom. Their different designations within Mitchell’s imaginary world – ‘purebloods’ and ‘fabricants’ – suggest ideas associated with race purity and robots, respectively. This classification gives readers clues to understand why they are perceived as creatures with distinct degrees of humanity. As Mitchell puts it:

‘To fabricants’ fabricators, their creations are organic robots: but for a compassionate and, in my view right-minded reader, yes, Sonmi is as human as Hae-Joo.

Throughout history, the collective consciences of master-races have made them unwilling to grant “equal-humanity” status to its subject races/groups. This unwillingness can manifest in Klu Klux Klan theories of Aryan ascendancy, or 1970s jokes told by the English about the Irish – the degree is different, but the motivation – dehumanization to legitimize exploitation – is, arguably, similar, whether the subtext is “They are lower forms of life than we are” or “They are more stupid than we are.” (DM, 61-70)

Mitchell’s words take us to two important aspects for the discussion of what it means to be human in Nea So Copros. First, concepts of humanity are context dependent. They are not produced in isolation by scientists, philosophers or politics.



Prevailing arguments about human nature are the result of an ongoing negotiation of meanings within a historical framework. While fabricants are conveniently regarded as organic robots by the society from which they emerge, they will be perceived as humans by the contemporary reader. According to the mindset of Nea So Copros, however, enslaving clones is not reproachable since they are perceived as mechanically reproducible objects rather than singular individuals. As Somni explains in *Cloud Atlas*:

‘To enslave an individual distresses the conscience, but to enslave a clone is merely like owning the latest mass-produced six-wheeled ford. In fact, all fabricants, even same stem fabricants, are singular as snowflakes.’  
(191)

The second aspect is the notion that history is inexorably cyclic, continually repeating itself after each cycle. In this sense, human predatory nature prevails and ultimately leads to the fall of civilization, as the sixth narrative of *Cloud Atlas* suggests in a distant future in Hawaii. There, destruction, rape and slavery threaten a group of survivors on a ship. Hrubes (2008: 111) interprets the sixth narrative not only as the fall of civilization but as the end of humankind: ‘one could argue that Zachry’s narrative in fact relates to the story of the end of *Homo sapiens* – as the term literally means’. Critics noted that such a bleak scenario is a meta-tyranny of a ‘progress’ that returns societies to the cycle’s beginning (Hrubes 2008). These two main ideas articulate the central themes of the novel, namely the tensions between tyranny and human nature, civilization and history. Both dichotomies are crucial to the understanding of human nature as conveyed in the novel.

In order to explore such themes in Somni’s interview with the ‘Ministry of Testaments’, David Mitchell endows the character with uniquely human features: full consciousness, agency and eloquence. ‘Fabricants’ are not supposed to have complex language, but Somni rises above her immediate circumstances. She transcends the constraints of her body and environment when she is given ‘chemicals to stimulate the broadening of her view of the world and the sharpening of her intelligence’ (DM, 11-2). As such, she becomes hungry for books. Somni’s ‘ascent’ – how the condition of being fully conscious is referred to in the novel – would not be enabled ‘without the intellectual nourishment of others’ ideas and thoughts’ (DM, 12-3).

In other words, in *Cloud Atlas*, human morals depend on the cultural experience too. Chemicals trigger Somni's appetite for books but reading materials are required to complete the process. This opportunity for intellectual enhancement will help Somni realize that rebelling against the system was an option. The genetically engineered waiter will then prepare herself for a 'battlefield' to be held 'at the molecular level' (342). Somni's plan consists of using the same chemical that enabled her ascension ('Dr Suleiman's ascension catalyst', 343) to provoke a simultaneous ascension of several million of fabricants. The way she does it is by adding the catalyst to key supply streams.

This plot would suggest that scientific products could be used in Nea So Copros not only to devalue humans but also to elevate them. However, this very possibility of revolution is itself predetermined and molecularly engineered, like everything else in Nea So Copros. As Mitchell puts it: '[o]f course, this is all being engineered in the background by the authorities, in order for Sonmi to become their manufactured agent provocateur. In Nea So Copros, even dissent is fabricated' (DM, 16-8).

### ***Brave New World updated***

Reviewers identified in the fifth story of *Cloud Atlas* echoes of 'creepy dystopian scifi' (Turrentine 2004), 'Huxley (or *Blade Runner*)' (Bissell 2004) and also George Orwell. The character Somni~451 – whose name is an homage to Bradbury's *Fahrenheit 451* – even mentions the fact that she has had the opportunity to read both Huxley's and Orwell's famous works given that they were considered 'Optimists' texts (i.e. corpocratic-friendly books). Similarities between *Cloud Atlas* and those popular fantasies are assumed and intentional. Clute (n.d.) notes, for example, that 'Mitchell's vision of the world of the 24th century' seems 'to have spatchcocked out of Huxley, Orwell and Ridley Scott's *Blade Runner*'.

Clute (n.d.) also suggests that the originality of 'An Orison of Sonmi~451' lies in the character's eloquence and sensibility rather than in the description of a futuristic scenario: 'as we are increasingly exposed to Sonmi-451's quite astonishing depth of feeling', we 'increasingly gain a sense that Mitchell has created a character smarter than we are'. I would add that what makes Somni~451 an empathetic character is

precisely her human features. In other words, by allowing Sonmi to sharply and eloquently tell her own story in a first person narration, Mitchell emphasises the human nature that lies dormant in every fabricant.

Mitchell's acknowledges that 'An Orison of Sonmi~451' has multiple literary influences. Orwell and Dick or Scott's *Blade Runner* and particularly Huxley are surely some of them, but there are others, including 'slave narratives' that are also connected to the notion of tyranny as a central theme in *Cloud Atlas*.

'It's a slave narrative, of course – probably the above mentioned *Narrative of [the life of] Frederick Douglass* is in the mix – tremendously readable if you don't know it, and paid the ultimate compliment by the indignant slave-owners of the day who were convinced that it had to be a hoax, because no Negro could write such an articulate indictment. Huxley – writing a genetics SF thing without being influenced by *Brave New World* is as impossible as writing a three minute pop song without being influenced (at some level, somewhere) by the Beatles, and for the same reason – it staked out this turf before anyone else. *Blade Runner*, sure – if "Replicant" hadn't already been used, I would have bagged the word, so I settled for "Fabricant". *Soylent Green* gets acknowledged. *Logan's Run*, a cheesy 70s American SF thing, but with a nice line in the *Claustrophobia of Paradise*. Non-literary, but large Asian shopping malls – there's one on Oahu, in Hawaii, too, near Waikiki, whose chief purpose is to vacuum up the yen of Japanese tourists. Such weird, unearthly places, repulsive and fascinating at the same time. Trace elements of 1984, and the autobiog [sic] of Malcolm X. [Yevgeny] Zamyatin's *We*. Bradbury's *Fahrenheit 451*.' (DM, 173-188)

Among all the literary inspirations mentioned by Mitchell, Huxley figures as an inescapable influence. In many ways, *Cloud Atlas* is in fact a '*Brave New World* updated' (Winter 2004). Mitchell re-enacts Huxley's preoccupations such as the critical view of scientific progress as an unlimited march forward; the idea that bioengineering is a form of defining social strata in the 'Social Predestination Room' and, finally, the 'principle of mass production' applied to human biology (Huxley 1973: 18). But if *Cloud Atlas* encloses an 'updated' version of Huxley's famous

fantasy, what exactly is the new element introduced by a fiction envisaged more than seven decades later? Is Mitchell saying anything fresh about the human condition? One possible answer lies in the narration itself. While in *Brave New World* the point of view is always that of higher stratum (the ‘alphas’), Mitchell found a narrative device that gives voice to a member of the enslaved layer of society. Allowing the story to be narrated in the first person by Somni, Mitchell encourages readers to put themselves in a different position than that experienced in *Brave New World*.

We also cannot read *Brave New World* today without taking into account the historical circumstances in which it was written. In the early 1930s, Britain was struggling with the devastating consequences of the Great Depression and the fearful prospect of a Second World War. The progressive perspective of science, which first thrived at the pinnacle of the Industrial Revolution, was still echoing during those times of uncertainty. It is amidst that historical context that Huxley challenges enthusiastic views of future and progress. While Huxley was worried about the excess of optimism regarding science and progress, Mitchell’s social and historical circumstances are the opposite; liberal, market-driven, historically placed after the horrors of Nazis and the Holocaust, leading to a darker vision of humanity. As Habermas notes, in the DNA Age hopes and fears are placed on biotechnological progress for medical and economic reasons. As he puts it:

‘What seems to be returning today, against a background of globalized neoliberalism, is the explosive alliance of Darwinism and free trade ideology, an alliance which flourished at the turn of the twentieth century’ (Habermas 2003: 21).

Mitchell’s vision of the future pushes the instrumentalization of human nature to the extreme. Human beings are cloned and designed in order to work endless shifts, genuflecting in front of company logos as if they were deities. Mitchell’s individuals are not regarded as autonomous, rational agents endowed with moral values. In other words, they are seen as passive consumers by the corporatic forces in charge. This scenario is enabled by the political use of genomics as an instrument of social control – without the ‘psycho-genomic’ drugs, individuals would have more capacity for rational dialogue and inquiry, which are uniquely human features.

In *Cloud Atlas*, fabricants are not depicted in a negative light as commonly

happens in literary fantasies (Ferreira 2005). Clones here evoke readers' empathy; they are not going to take over the world. Rather, they are exploited, deprived of their human dignity and autonomy. As consumers or as a zombie-like workforce, individuals do not fully exercise the attributes Mitchell values as defining features of human nature: curiosity, critical thinking and self-awareness. As such, the novel's view of the human condition is a very bleak one.

### **Conclusion**

The fantasy of bio-engineering human society for efficiency and organization goes back as far as *Brave New World*. However, Mitchell's engagement with the imaginative horizons opened up by molecular genetics offers a bleaker perspective on what it means to be human in a futuristic context. Mitchell's genetically engineered world is far more pessimistic than Huxley's biochemically and physiologically engineered worlds. Huxley envisaged a society controlled by hedonism; Mitchell's fictional world is cruel and violent. This aspect brings me back to the chief argument of this chapter: in *Cloud Atlas*, violence and tyranny are presented as part of the human condition. As such, protagonists appear to be destined to endlessly repeat the actions and events of human history. The consecutive narratives suggest, in the order in which they are told, that the capacity for tyranny and exploitation is an essential part of humans. Science is just one more political instrument that leads humanity to a post-apocalyptic and desolate existence.

Looking at the future, Mitchell invites the reader to engage with questions being currently discussed in debates about what it means to be human in the biotechnological age (Fernández-Armesto 2005, Fukuyama 2003, Habermas 2003, Malik 2001a). Contemporary science, in particular modern biology, regards human beings as objects rather than subjects – as Malik puts it, 'science has lost its sense of freedom, has become mechanistic, because the idea of freedom has become degraded in politics too' (2001a: 363). This pessimistic view of the human condition, *partly* motivated by scientific materialism and its gene-centred disciplines, is reflected in the futuristic and technologically advanced society described in *Cloud Atlas*.

## Conclusion

This final chapter provides an overview of each of the analytical chapters before presenting some conclusions on novelists' views of human nature. I then move on to comment on these novelists' relationship with ideas conveyed by popular science authors. I conclude the thesis as a whole with some brief statements on the contribution of this research to science communication studies.

The novelists I have considered incorporate in their narratives, with varying degrees of sophistication and for different purposes, concepts and metaphors drawn from gene-centred disciplines. My exploration of Margaret Drabble's *The Peppered Moth* (chapter four) argued that the novelist gradually changed her view of human nature – and that this change had implications for her writing. She used to believe that all individuals were born with the same capacity for reflection, judgement and creativity, and were subsequently moulded by their experiences and surroundings. Now Drabble tends to see genetics as much more controlling over human nature.

Drabble's shift of perspective is expressed in her novel *The Peppered Moth* but it does not directly affect the outcome of the main characters. Drabble herself rightly argues that the ending is open to doubts regarding the role genes play in human behaviour. Nevertheless, we have seen that the anxiety about genetic influence is present throughout the book, and this may be understood as an expression of the cultural weight earned by biological determinism.

In chapter five I discussed Maggie Gee's view of human nature and how this perspective is echoed in *The Ice People*. I concluded that Gee believes that humans now experience a disjointed existence because their cultural evolution has surpassed biological evolution. Because of their evolved brains, humans believe they are special creatures. They fail to realize that they are just "biological beings" (MG, 464), i.e. genetic entities that should not ignore their animal nature (or their instincts, for those who prefer that term). One expression of this, Gee believes, is the fact that Western women are postponing pregnancy and thus ignoring their biological clocks.

Gee's ideas regarding human nature are reflected in her writing. In *The Ice People*, technological progress – including genetic technologies and its medical possibilities – is intimately related to civilizational decay. The novel portrays a hopeless world where infertility is the price a technological society must pay for its advanced lifestyle. In addition, a mutation in robots that mingles organic and inorganic particles leads them to attack humans. The narrative is told by a dying man who, impelled by genetic imperatives, spent his last years fruitlessly searching for his son. Gee's representation of humanity is thus a pessimistic one.

My discussion of David Mitchell's *Cloud Atlas* (chapter nine) focused on its disenchanting view of the meaning of humanness and the role genomic sciences plays in it. Throughout the six narratives interwoven in the book, Mitchell fictionally examines the human drive for power and profit from the mid-nineteenth century to a post-apocalyptic future. Tyranny and exploitation are presented as constant elements of human history – and, therefore, as part of human nature. Violence and greed are expressed in the form of colonisation, murder, corruption, cannibalism, slavery, personal relationships and the use of scientific knowledge. Genetic engineering is just an ultimate form of exploitation of individuals in a society where everything is predetermined and molecularly manipulated. As in Gee's *The Ice People*, the pervasive use of cutting edge technologies is followed by the decay of civilization.

Chapter six was dedicated to Simon Mawer and his novel *Mendel's Dwarf*. I concluded that Mawer argues for a degree of unpredictability in human reproduction, so that human nature can be maintained as we understand it today – flawed but creative, imperfect but surprising in its diversity and cultural products. He also believes that the inner workings of the human mind and behaviour will never be fully explained by a reductionist science. But that alleged limitation will not stop humans from manipulating the units of life as if they were Lego. On this point, Mawer's and Gee's positions converge: both think humans are no longer humbled by nature and regard human hubris with pessimism.

Mawer imagines the pressing problems of DNA technologies as Jacob's ladder, where we are given the choice of ascending or descending towards hell. He shows a degree of suspicion about genetic science that is rooted in the extreme examples of science overstepping ethical thresholds in the twentieth century. This discomfort is fully represented in *Mendel's Dwarf*, a narrative in which the boundaries between genetics and eugenics are again disassembled. The main character uses a new

method of prenatal screening to select embryos produced with his sperm but, since he opted to go down Jacob's ladder, his attempt to circumvent the contingency of life is punished by the end of the narrative. In the realm of fiction, reproduction continues to be left to chance.

The chapter on A.S. Byatt and her novel *A Whistling Woman* also focused on human morals and ethics (chapter seven). I argued that Byatt's perception of human morality is anchored in our genetic biology. Like Maggie Gee, she is suspicious of the idea that humans are exceptional creatures. Byatt regards humans as clever animals.

My discussion of *A Whistling Woman* suggested that the novel explored, in its profusion of characters and plots, the implications of the belief that human ethics and morals can be placed on a scientific basis. In the narrative, academic characters hold distinct views on the subject: while a mathematician rationally agrees with the assumptions of genetic determinism advanced by a biologist, he also thinks such ideas remove all the meaning from life. This tension over the blurring of moral boundaries of human behaviour remains unresolved by the end of the novel.

We find another unanswered inquiry about the human condition in Carole Cadwalladr's *The Family Tree* (chapter eight), a novel that consists of a dialogue about what is controlling in human nature. The narrator is a humanities part-time scholar who is married to a behavioural geneticist. They have completely different views of human nature. The main character examines both perspectives of the human condition while trying to deal with the fact that she may have a genetic predisposition to certain illnesses. However, the ending of *The Family Tree* does not provide any answer about the inquiry of its main character. Carole Cadwalladr herself is undecided about her personal views on the subject.

These views of human nature matter, and their fictional depictions are of significance too. Literary novels are an important part of the spectrum of the cultural arena where knowledge is negotiated. It is from our cultural vision of the human condition that the sort of scientific knowledge we wish for emerges (Peters 2003: xiv). As such, our view of the human condition helps to shape the agenda of the science we, as a society, want to put into practice.

Social conceptions of human nature are intimately connected with changes in the scientific, politic and cultural landscape. They are neither stable nor fully



coherent. In analysing the extent to which contemporary novelists have accepted a more genetically deterministic view of human nature, and whether this affected the stories they were able to tell, I did not intend to rigidly categorize authors either in the pigeonholes of 'nature' or 'nurture'. This would be too simplistic. If reasonable, these imaginary pigeonholes would have to be flexible, accommodating both intersections and overlapping areas.

What my interviews with the novelists have shown is that they do not tend to regard humans solely as products of their environment. To varying degrees, they acknowledge the existence of biological constraints. Authors like Margaret Drabble, A.S. Byatt and Maggie Gee make a gesture towards a naturalistic view of human behaviour. This does not mean that they reduce humanness to DNA in their discourses. More importantly: this does not necessarily condition the outcome of their novels.

These are times of change in human self-conception. All the novels I have considered in this study display a tension between a humanist and a naturalistic view of human beings. They do not offer easy solutions at the end of their narratives. They accommodate and deal with uncertainty in their plots – and I argue that this is one of the aspects that make literary novels a privileged medium for negotiating the relationship between science and society. Novels such as *The Family Tree*, *A Whistling Woman* and *The Peppered Moth* leave unanswered questions about what controls human behaviour or morals. Regardless of their authors' personal views on the subject, these fictional narratives sustain an inquiry about contemporary views of humanness. Characters think over why they are the way they are, and why their family or partners behave the way they do. Of course literary characters have done this for centuries; the difference is that they now do it with the explanatory tools available today. They ponder and probe such uncertainties and they do so not only in the light of their intuitive understanding of the subject, but also of the genetic knowledge they have access to. As a result, readers of such novels can potentially identify themselves with the issues therein presented, reframing or challenging them.

The characters addressed in this study are questioning the nature of their own decisions and feelings – and also those of other people they engage with. Are they naturally given or socially and culturally constructed? In the light of genetic determinism, these fictional entities ponder whether people are less responsible for their acts. In *The Peppered Moth*, the narrator questions whether Faro will return to

North England only because she discovered, after taking part in a mitochondrial DNA study, that there lies the genetic cradle of her female ancestry. In *The Ice People*, Saul muses over his desperate journey to rescue his beloved son: was it just because a father is, rather than a passionate hero, just ‘one tiny unit of biology, stopping at nothing to save his genes’ (208)? In *The Family Tree*, Rebecca rules out aborting her pregnancy even though she ‘almost consigned her [the baby] to an NHS bin bag’ (381): ‘[i]t feels as if I’m being overtaken by something else. As if I’m part of a single mononuclear organism that wants its own kind to propagate, no matter what’ (369). These characters doubt their agency and ability to shape their own destiny. They question whether they are more victims than agents, objects than subjects. But they do not provide readers with definite answers.

The novelists considered in this study have also evoked the horrors of the twentieth century either in their novels or in interviews. We are now living periods of uncertainty, in which individuals are simultaneously baffled by the prospects of post-human futures and haunted by what the rear mirror of history continues to show. Mawer’s novel is an expression of the perceived dangers of eugenics re-entering via backdoor (Duster 2003). ‘The old eugenics died with the Third Reich but make no mistake, the new eugenics is with us’, says the main character in *Mendel’s Dwarf* (280). Ironically, this disenchantment with genetics appears to be coupled with a fascination with its explanatory power. Pessimism about the human condition can be found in Maggie Gee’s, Simon Mawer’s and David Mitchell’s discourses (both personal and fictional).

Malik (2001a) considers bleak contemporary perspectives of human nature as being partly motivated by scientific materialism and its gene-centred disciplines. He rightly claims that the heavy historical weight of the twentieth century still has implications for the way we regard the human condition. This leads to a deep pessimism about the human condition – human beings cease to be regarded as exceptional, special creatures:

‘In the post-Holocaust world, the very idea of human mastery has come to be seen as suspect. The mastery of nature seems to have brought environmental destruction, global warming, and the mass extinction of species. The attempt to master society has led to fascism and Stalinism.’  
(Malik 2001a: 358)

In an event organized by the Institute of Ideas in London, Maggie Gee responded to Malik's ideas partly acknowledging his diagnostic (Malik 2001b: 29-31). Gee argued that she cannot forget what history has to say about what happens when humans feel glorious and unstoppable about their technological power over nature:

'The fact is, some scientific optimism wears badly. . . . Stalin's Russia, Hitler's Germany, Mussolini's Italy, Franco's Spain, Mao Zedong's China, all believed fervently in the transforming powers of the human will.' (Gee in Malik 2001b: 30)

She also maintained that if an extra-terrestrial creature were to regard humans in the bed or toilet it would not distinguish us from other animals. In so answering, Gee has shown a reinforced scepticism about the idea of human control – and with this I mean not only control over nature, but also over society and self. Her discourse echoes the narrative pattern found in popular science books on sociobiology and evolutionary psychology, in which 'stories about humanity add extra immediacy to their appeal by emphasizing the future dangers that await if we fail to recognize and deal with our animal past' (Jackson & Rees 2007: 923).

Here we arrive at a paradox. The contradiction consists of nurturing fears about the practical consequences of genetic science and, simultaneously, finding comfort and solace in biological accounts of what it is to be human (Malik 2001a: 346-7). Sociobiology and evolutionary psychology have come to dominate scientific studies of human nature; their accounts of human behaviour tend to present humans less as agents and more as passive individuals whose morals and conduct are determined by nature. Genes are at the heart of these disciplines, even when their accounts of human nature are presented as evolutionary tales with stone-age roots. The key message to be conveyed is that human behaviour and society are evolutionary products, and genes are the minimal units to be selected in that process.

Gene-centred narratives tend to be presented in popular science books in a literary form, mimicking a 'grand narrative'. In the 1990s, a few popular science authors gathered considerable visibility in different media platforms (Cassidy 2005) and they caught the attention of novelists (Waugh 2005). Novelists considered in this

study have read popular science books containing such narratives. In the interviews, many of them mentioned popular science documentaries and events as sources of information. The appeal and the explanatory force of genetic and evolutionary accounts are understandable: they deal with central questions to literature, i.e. birth, sex, death, family and human origins.

Authors like Cadwalladr, Drabble, Byatt and Gee have read popular science books on genetics, evolution and cognition as part of their research to write their novels. Their comments suggest that, without popular science books, it would have been difficult to achieve the level of understanding required to subsequently embed those ideas in the narrative. The same explanatory force that novelists seem to appreciate in the ‘new science writing’ is, at the same time, criticized when its arguments are unreasonable or reach fundamentalist or exaggerated proportions.

My novelists are fascinated by genetic accounts of human nature but they appear to consume this information critically. Even though Carole Cadawalldr concedes that those who are today trying to address the “fundamental questions, philosophical questions” (CC, 944-5) are the evolutionary psychologists, she also thinks that they exaggerate when claiming to have *all* the answers (“they all became post-modern priests in a way, and they’re atheists!”), CC, 544-5). David Mitchell agrees: ‘[genetics] [i]t’s our age’s best answer to the eternal questions which literature exists to chew over: why we are who we are, and how we are what we are’ (DM, 213). But Mitchell too, as Cadwalladr, has a caveat. There are moments in which Mitchell thinks that ‘the Neo-Darwinist gospel can make a pretty good job’ about explaining the human condition (DM, 103), but there are others in which evolutionary psychologists seem ‘to have devised a system that cannot go wrong’ (DM, 110-1) – and this ‘ends up being reductive’ (DM, 114), Mitchell believes. And also Gee (1998), despite her emphasis on embracing an ‘animal life’, stresses that evolutionary psychology cannot have all the answers: ‘Pinker is remarkable for the intoxicating hubris with which he takes on the whole of human thought, feeling and behaviour.’

Like other members of the popular science audience, novelists are not passive receptors. The fact that they adapt genetics accounts to their own stories only shows how critically and complexly information is processed. Their novels show not only that messages are constantly being transformed but also that novelists themselves are both producers and consumers of media artefacts that help to shape the public understanding of science. They adopt scientific ideas whilst permanently reframing or

challenging them. As Cassar (2005: 320) observes, 'contemporary writers do not limit themselves to officially sanctioned interpretations of the scientific theories they explore, opting instead to challenge their readers'.

My novelists resort to ideas and metaphors drawn from genetics as literary devices to explore the human condition in their texts. In other words, these contemporary writers find in scientific knowledge explanatory elements that serve their literary needs. They do not passively incorporate genetic explanations of human nature in their texts. Rather, they seem to digest the scientific information, incorporating in their novels only the portions they find convenient or interesting to their particular narratives. As Hayles (1984: 59) puts it: '[w]hereas scientific theories are created through the attempt to express the field view in rigorously exact models, the literary strategies are forged by the desire to find a form, and a language, adequate to interpret its human meaning'.

In the introduction to this study, I quoted Malik (2001: 7) on the current pessimism about the human condition: '[t]he language of humanism no longer seemed adequate, and yet no new language seemed available to replace it'. What the novels considered here express is precisely this search for a new language. The main challenge of this new cultural idiom is how to reconcile the projects of science and humanism. Once this new language is found, perhaps it will be possible to articulate conflicting views of humanism and scientific materialism, and to imagine, as a result, a humanised scientific portrait of what it means to be human.

I will end with some comments on the contribution of this thesis to science communication studies. In this research, I have demonstrated that literary fiction should be more often regarded as a possible vehicle for science communication. Investigations on media artefacts that help to shape the public understanding of genetics often focus on news media and science fiction (Bates 2005). While both are valuable sites for exploring cultural images of genetics, this thesis shows that literary novels also play an important role in the 'genetic theatre' (Dijck 1998). If we were to establish a full picture of the meanings that circulate in the cultural arena, we ought to study as many types of cultural products as possible. The more actors we consider, the better our understanding will be of what is happening in this 'genetic theatre'. My hope is that this exploratory study will provide ideas for future empirical research

questioning the role of science in literary fiction.

Literary novels afford the opportunity to be studied as cultural products that facilitate the public discussion of scientific issues. Reading a novel is a solitary activity. This aspect may contribute to the idea that a reader of novels does not engage in public discussions. This would be wrong. Reading a novel is a social practice that does not finish with the last sentence of a book. Once read, a novel offers new discursive tools and perspectives that may stimulate discussions about its content – and now this is possible even when readers are not physically gathered. As such, literary novels both in print and digital form should be considered as possible objects of study in science communication.

Public discussions of literary novels are already taking place in book clubs and online communities. For example, questions for reading group guides interested in discussing novels such as A.S. Byatt's *A Whistling Woman* and Simon Mawer's *Mendel's Dwarf* are available on the Internet.<sup>23</sup> David Mitchell's *Cloud Atlas* was discussed over four weeks by the Guardian Book Club participants (Mullan 2010). Online social networks, such as Twitter and Facebook, are also helping to bring together people interested in the same topics. Electronic devices like Kindle allow readers to build communities while sharing information about the books they are reading and highlighting excerpts. These online social practices are of great importance in a time when, according to official figures, consumer e-book sales help to offset a decline in the market for printed books (Flood 2012). Exploration of these digital forms of public engagement constitutes an interesting path for future research.

To summarize, what this thesis has shown above all is that novelists are able to incorporate ideas about genetics in their texts without mechanically repeating reductionist discourses. Literary novels offer several advantages compared to the expository writing: they are a flexible literary form; they deal imaginatively with the human experience; and effortlessly accommodate multiple perspectives, open-ended questions and complex ideas such as doubt and ambiguity. By holding these qualities, literary novels afford the opportunity to explore the interactions between science and society as a contingent and complex endeavour.

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<sup>23</sup> See, for example, these two websites:

[http://www.readinggroupguides.com/guides3/whistling\\_woman1.asp](http://www.readinggroupguides.com/guides3/whistling_woman1.asp) and [http://www.readinggroupguides.com/guides\\_M/mendels\\_warfl.asp](http://www.readinggroupguides.com/guides_M/mendels_warfl.asp). Both include questions concerning science and the ways in which it bears on the characters' journey and psychology.

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## Appendix I

### List of the novels meeting the research criteria

<b>Author</b>	<b>Title</b>	<b>Year</b>
Byatt, A.S.	<i>A Whistling Woman</i>	2003
Cadwalladr, Carole	<i>The Family Tree</i>	2006
Drabble, Margaret	<i>The Peppered Moth</i>	2001
Faulks, Sebastian	<i>Human Traces</i>	2006
Gee, Maggie	<i>The Ice People</i>	1998
Ishiguro, Kazuo	<i>Never Let Me Go</i>	2005
Lessing, Doris	<i>Ben, in the World</i>	2000
Lessing, Doris	<i>The Cleft</i>	2007
Mawer, Simon	<i>Mendel's Dwarf</i>	1997
McEwan, Ian	<i>Enduring Love</i>	1997
McEwan, Ian	<i>Saturday</i>	2005
Mitchell, David	<i>Cloud Atlas</i>	2004
Smith, Zadie	<i>White Teeth</i>	2001

## Appendix II

### List of the novels from the corpus

<b>Author</b>	<b>Title</b>	<b>Year</b>
Byatt, A.S.	<i>A Whistling Woman</i>	2003
Cadwalladr, Carole	<i>The Family Tree</i>	2006
Drabble, Margaret	<i>The Peppered Moth</i>	2001
Gee, Maggie	<i>The Ice People</i>	1998
Mawer, Simon	<i>Mendel's Dwarf</i>	1997
Mitchell, David	<i>Cloud Atlas</i>	2004

## Appendix III

### The interviews

<b>Author</b>	<b>Novel</b>	<b>Date(s) of interview</b>	<b>Code</b>
A.S. Byatt *	<i>A Whistling Woman</i>	9 <sup>th</sup> December 2009	ASB
Carole Cadwalldr	<i>The Family Tree</i>	4 <sup>th</sup> November 2009	CC
Margaret Drabble	<i>The Peppered Moth</i>	14 <sup>th</sup> August 2009	MD
Maggie Gee	<i>The Ice People</i>	21 <sup>st</sup> August 2009	MG
Simon Mawer	<i>Mendel's Dwarf</i>	28 <sup>th</sup> July 2009	SM
David Mitchell *	<i>Cloud Atlas</i>	From 13 <sup>th</sup> September 2009 to 26 <sup>th</sup> February 2010	DM

\* Interviewed by e-mail



## Appendix IV

### Interview with Margaret Drabble

This transcript is included to give a sense of how interviews were structured.

AAS There is something that puzzles me: how do you perceive your characters in bodily terms? In your mind, your characters, are they flesh and blood?

MD Do I see them as part of the flesh and blood? Yes, I do see them physically, and only when have a very clear physical picture of my characters do I feel that they've come to life and have an independent life within the book. Sometimes it takes quite a long time for that physical reality to become clear to me. But yes, the physical reality does become clear. Humm... but are you asking... humm... where that comes from or just do I have a clear picture?

AAS No, not where they come from, just if you have a clear picture and how do you perceive them. In your mind, you feel you can almost touch them? Do they have a sort of tangibility?

MD Yes, yes, they do have a body, I know how their faces look like, and I know what clothes they wear, and what shape they are, yes.

AAS Ok.

MD Well, the principal characters, sometimes the very minor characters. Sometimes I introduce a minor character that look like very closely on somebody I've seen that day because the appearance was striking. But there are different kinds of characters, there are principal characters and the very minor that talk on small parts and you have slightly different attitudes towards them, I think.

AAS Can you notice in them patterns of behavior or even biological traits – such as being depressive, distressed or easily happy with the small things that happen? What I am trying to ask is if this idea [of a character], in bodily terms, does also include in your mind a pattern of behavior...

MD Yes, they're characters; therefore they have some sentimental characteristics, which is what a character is. And I suppose that one of the things a novelist is interested in is where these characteristics came from, whether they can change them or not, when does the child turn into adult, whether the characteristics were inherited or a result of circumstances.

AAS That is exactly the point I would like to discuss, because sometimes we have the idea that everything that is biological is a sort of fate, but environment can also be regarded as a coat that is too tight to put off. Err... Especially in *The Peppered Moth*, there is room for inherited and environmental characteristics [to be put] together. How did you manage to balance both in your characters?

MD Well, I will have to answer to that historically. When I was younger and wrote my earlier novels I was convinced that environment was more important than genetic inheritance. And I think it was fashion in the 1960s and the 1970s to believe that nurture was far more powerful than nature, and that the child was a blank slate and if you adopted a child it would become you rather than the genetic inheritance, but I think that the scientific discoveries of the last twenty, thirty, years they deeply affected our views of how much we could alter. It no longer seems a question entirely of willpower, as to what you can change in yourself or whether if you could evolve away from your environment. The force of genetic inheritance didn't seem more of a straight jacket. Now we tend to see our genetic inheritance as much more controlling than we thought it was when I was young. So, in *The Peppered Moth* that was precisely the question I was exploring. It was: how much you inherit and how much the society alters you and how much is it that you cannot alter.

