



Interfacing Science, Literature, and the Humanities / ACUME 2 Vol. 8

Paola Spinozzi /
Brian Hurwitz (eds.)

ACUME 2 / Vol. 8

Discourses and Narrations in the Biosciences investigates the forms of writing in which scientific claims are formulated. Argumentative strategies, compositional rules, and figurative expressions in communication and narrativization of scientific knowledge are the focus of interdisciplinary contributions by humanities and science scholars. The first part, 'Rhetorical and Epistemological Aspects of Science Writing', addresses how scientific pursuits feed into multi-level texts that generate responses within science, society, and culture. The second part, 'Bioscientific Discourses and Narrations', examines popularizations and fictionalizations of science in relation to diversity, deviancy, ageing, illness, reproduction, the evolution of humankind, mathematical models of biomedical systems, and the myth of the heroic scientist. Assessing the narrative impetus and command of literary and meta-discursive strategies shown by contemporary science writers enhances understanding of the methods and conventions through which the biosciences produce knowledge.

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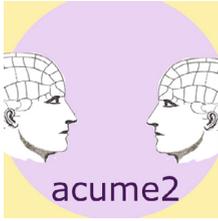
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Socrates

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DONNA con l'ali al capo, nella destra mano tenghi vno specchio, & con la sinistra vna palla sopra della quale sia vn triangolo. Scienza, è habito dell'intelletto speculatiuo di conoscere, & considerar le cose per le sue cause.

Si dipinge con l'ali, perche non è scienza doue l'intelletto non s'alza alla contemplatione delle cose; onde sopra di ciò ben disse Lucretio nel lib. 4. della natura delle cose.

Nam nihil egregius quã res discernere apertas. A dubijs Animus, quas ab se protinus abdit.

Lo specchio dimostra quel che dicono i Filosofi, che *scientia fit abstrahendo*, perche il senso nel capire gli accidenti, porge all'intelletto la cognitione delle sostanze ideali, come vedendosi nello specchio la forma accidentale delle cose esistenti si considera la loro essenza.

La palla dimostra, che la scienza non hà contrarietà d'opinioni, come l'orbe non hà contrarietà di moto.

Il triangolo mostra, che si come i tre lati fanno vna sola figura, così tre

termina.

The Quest for Longevity and the End of Utopia

You know, it's really very peculiar. To be mortal is the most basic experience, and yet man has never been able to accept it, wholly grasp it, and behave accordingly. Man doesn't know how to be mortal. And when he dies, he doesn't even know how to be dead.

Milan Kundera, *Immortality* (1991)

I. An Interfaced Approach to Ageing

This chapter takes the form of a dialogue between a scholar of utopia and a scientist who has been reading utopian literature and science fiction for many years and whose research concerns the biological basis of ageing and longevity. Three issues will be addressed: longevity from an evolutionary point of view; representations of the body, age, and illness in past utopias; longevity in a globalised world.

II. Longevity, the Body, and Evolution

Longevity involves the body and disease as well as their conceptualisation and historicity from an evolutionary point of view. Classical and Judaic-Christian conceptions provide inadequate knowledge of the body and illness. Despite a few significant modifications in the Middle Ages, the scenario remained fundamentally unchanged up to the seventeenth century.

An evolutionary perspective emerged a hundred and fifty years ago. Since the publication of Charles Darwin's *On the Origin of Species* (1859) the bio-evolutionary framework has widened enormously our temporal perspective and our historical vision of biological phenomena. Today we know that *Homo sapiens* is the result of a long evolutionary history of life on earth which began around four billion years ago and saw the appearance of primates about five million years ago. The most probable dating sets the advent of *H. sapiens sapiens* about three

hundred thousand years ago, but some of his history's fundamental stages occurred much more recently: about fifty thousand years ago the acquisition of language; ten thousand years ago agriculture and the domestication of animals; around five to seven thousand years ago the development of writing.

A couple of centuries ago an extraordinary evolutionary acceleration deeply modified the planet's environment and resulted in significant changes in life expectancy, at least in what we refer to as the most economically advanced countries. Demographic data, despite limitations such as the paucity and fragmentariness of the sources, suggest that until the end of the eighteenth century, even in the most prosperous countries and regions of the world, average life expectancy of the species remained around 35–40 years, i. e. not very different from what it had been in the preceding centuries and even millennia.¹

After 1840 a demographic revolution took place, which in less than two centuries brought life expectancy from 40 to more than 80 years, with a gain of about three months a year for the past 160 years. In the European Union average life expectancy is increasing at the rate of more than 2 years per decade, a regular and progressive phenomenon that shows no sign of declining and that has, amongst its major causes, a definite decrease of mortality after 65 and especially after 80 years of age.

Demographers have differing opinions about the significance of this phenomenon: 'futurists' believe immortality is within our grasp, 'optimists' consider it plausible that in this century life expectancy at birth will reach 100 years, and 'realists' (also known as 'pessimists') reckon average life expectancy will not be able to go beyond 85 years unless drastic medical and biological steps forward are achieved.²

Evolutionary medicine,³ which sees our body as a biological object, the fruit of evolution and genetics/genomics (a grouping of disciplines that seeks to identify all the information of evolutionary history) is opening up broad vistas on health and longevity. High expectations have been raised by reparative medicine, which uses stem cells as tools for fighting (and winning, perhaps decisively) the battle against ageing and disease. It seems that in every organ and tissue of our body there are cells which not only have a much lower rate of

1 *Exceptional Longevity: From Prehistory to the Present*, ed. by Jean Bernard and James W. Vaupel, 2 vols (Odense: Odense University Press, 1995), Monographs on Population Aging, II, pp. 1–169.

2 Claudio Franceschi, Luciano Motta, Massimo Motta, Mariano Malaguarnera, Miriam Capri, Sonya Vasto, Giuseppina Candore, Calogero Caruso, and IMUSCE, 'The Extreme Longevity: The State of the Art in Italy', *Experimental Gerontology*, 43, 2 (February 2008), 45–52.

3 Gilberto Corbellini, *Medicina basata sull'evoluzione. Le lezioni italiane* (Bari: Laterza, 2007); Rita Ostan, Laura Bucci, Miriam Capri, Stefano Salvioli, Maria Scurti, Elisa Pini, Daniela Monti, and Claudio Franceschi, 'Immunosenescence and Immunogenetics of Human Longevity', *Neuroimmunomodulation*, 15, 4–6 (2009), 224–240.

damage and error accumulation, but also retain an ancestral capacity to originate new cells and tissues, thus almost completely repairing damage caused by the injuries of age and the environment. According to some, the foreseeable perspective in the short term is that of constituting banks of stem cells for each individual, to be used in a systematic way to regenerate deteriorating parts of the organism such as teeth, muscles, heart, and brain. This prospect is revolutionising medicine and all aspects of human life, including diseases and death. It is easy to imagine what an enormous upheaval will be caused by the capacity to heal diseases which significantly impair the quality of human existence (tumours, cardiovascular diseases, dementia, diabetes, osteoporosis, osteoarthritis among others), including the possibility of ‘producing’ *in vitro* spare organs, an idea first envisaged by scientific utopian writers such as Aldous Huxley. Such diseases are currently the greatest ‘killers’ and this prospect will have an immediate impact on lifespan whose current limits could well be overstepped by a wide margin.

III. Humanistic Tradition and Utopia

To what extent can theories of the body and disease developed in the humanities be helpful to interpret the results of scientific research today? Philosophical, ethical, and religious frameworks appear ill suited to the rapidity of the changes science is posing. There is a serious mismatch between the large body of scientific knowledge now available and humanistic conceptions which are based on quite ‘primitive’ sources dating back to when data on the human body and its evolutionary history were still largely unknown and unpredictable. Nonetheless, this is the knowledge upon which contemporary cultural responses are founded. The question to be addressed is whether philosophical, ethical, and religious elaborations on the human body can adequately assimilate (and respond to) the impact of scientific knowledge, which has substantially modified the length of human life, procreation, disease, and physical suffering.

As an example of the difficulty of reconciling our humanistic tradition with current scientific findings and trends we will examine the conceptualisation of human finitude.⁴ In its acceptance the ancients identified the zenith of wisdom.⁵ Our philosophical and religious legacy is best exemplified and refracted through

4 See Vita Fortunati, ‘Pienezza dell’Essere e paura del Nulla in Utopia’, in *Perfezione e finitudine. La concezione della morte nell’utopia in età moderna e contemporanea*, ed. by Vita Fortunati, Marina Sozzi, and Paola Spinozzi (Torino: Lindau, 2004), pp. 31 – 55.

5 Ivano Dionigi, ‘L’inconveniente dell’immortalità’, *Bollettino delle Scienze mediche*, Anno CLXXX (2008), 39 – 46 (the issue is dedicated to ‘Il mito dell’eterna giovinezza tra biomedicina e umanesimo’ [‘The myth of eternal youth between biomedicine and the humanities’]).

utopian literature. Viewed within classical and biblical frameworks, the body, death, and finitude reveal the contradictions and antinomies on which utopian constructions are based.⁶ Old age has always constituted a puzzle because the problem of ageing is tightly associated with illness and death.

The utopian project of a land where harmony and perfection have been attained is dominated by a reason that wants to check and control everything. Old age, illness, and death have always been problematical precisely because they represent the failure of the enterprise undertaken by the utopian writer, who aims at simplifying and reducing the anthropological complexity of man. Human limits are uncanny signs indicating the impossibility of reconciling the oppositions between nature and nurture, body and mind, which structure our understanding of the human condition. In utopia a series of strategies is enacted in order to hide aspects of reality that produce instability and disorder, or, where these aspects are indeed confronted, a normative and rigid approach is adopted.

'Nowhere' (ou-topos) also presupposes an unalterable, incorruptible nature, unscarred by the effects of time. In this sense, utopia's genealogy from the myth of Eden appears evident. However, the archetype of the genre, Thomas More's *Utopia* (1516 in Latin, 1551 in English), also reveals that perfection is unattainable because man has been stained by original sin. The pagan myth of the Golden Age has been contaminated by the chastisement of Adam and Eve banished from the earthly paradise.

Utopias are characterised by a double tension: on the one hand, an aspiration to purity and a return to primordial origins imply the nostalgic concept of a benevolent and fertile Nature; on the other, the concern for regulation and planning is obsessive. This tension reveals that the relationship between the myths of paradise and the ideal city is dialectical and affects the attitude utopia adopts towards elderly people. The old person is revered, honoured as the one whose wisdom is connected to a cyclical conception of time. The rhythm of the seasons, 'the works and days' repeat themselves: those who have seen more, know more. For this reason, 'to know is to remember', as Plato maintains in *Meno*, and old people, for their heap of memories, are rich in knowledge. Nevertheless, the elderly are also disquieting figures because they bear a body which has deteriorated and become corrupted. An ageing body is no longer the vehicle of being 'in the world' but an obstacle that requires overcoming in order to remain in the world. From this perspective, old age is an element of disorder in

6 Fortunati, 'Ageing and Utopia through the Centuries', *Ageing*, 10, 2 (1998), 77–82; Id., 'Vecchiaia', in *Dizionario dei temi letterari* (Torino: Utet, 2007), pp. 109–120. See also *Histoire transnationale de l'utopie littéraire et de l'utopisme*, coordonnée par Vita Fortunati et Raymond Trousson, avec la collaboration de Paola Spinozzi (Paris: Honoré Champion, 2008), in particular 'Utopia', pp. 81–96, 'Gulliver's Travels', pp. 345–356, and 'News from Nowhere', pp. 677–687.

utopia, a stain to be cleansed from a world that strives to be perfect and harmonious. Indeed, this ambivalence explains the reason why in utopia the myth of longevity is tightly connected to nourishment and food, which acquire a clear moral meaning. A healthy life is frugal, sober, and requires a rigid diet. Thus, in utopia, physicians, physicists, and botanists work out a diet which is often vegetarian, based on milk and wheat.⁷

Western utopia reflects ambivalent social attitudes towards the elderly who, over the centuries, have always been double figures. Representations of the elderly are extreme, because they are subject to the law of everything and nothing, an ambivalence which permeates the great myths on which imagery of old age is founded, and the thinking of Plato and Aristotle.

Plato idealises old age: in *The Republic* Cephalus becomes the model of the old man who is happy because he is virtuous. Old age constitutes a serene conclusion to the life of an honest person, whose enjoyment of spiritual pleasures is enhanced by freedom from disquieting passions. Both in *The Republic* and in the *Laws* Plato foresees a type of government presenting all the features of a gerontocracy. In his ideal republic old men hold a position of honour because 'there can be no doubt that the elder must rule the younger' (Plato, *The Republic*, III, 412 cs.).

Aristotle, instead, deconstructs the ideal model of the old person and in his *Rhetoric* describes an old man who is the exact mirror image of Plato's Cephalus.⁸ All the negative aspects of old age are staged: avarice, cowardice, egoism, pessimism, impotence, and rigidity of spirit. At the basis of this negative vision there is the Aristotelian concept of the tight interdependence between soul and body: the decrepitude of the one inevitably touches the other. For this reason, old people must be kept away from the government of the city and the Gerousia of Sparta becomes a typical expression of bad government: for Aristotle, old age is neither a guarantee of wisdom nor of political ability.

The great debate on old age pervading the history of Western medicine begins with Aristotle: is old age a disease characterised by involutinal phenomena or is it a natural phenomenon itself? According to him, Hippocrates and later on Galen, old age is itself a disease, a marasmus ('morbus'), an inevitable affection invading the body. Aristotle's biological model was determined by two processes, the first evolutionary, the second involutinal, the passage from the first to the second being marked by a disequilibria of two fundamental physical qual-

7 The relationship between food and longevity first appears in the utopian works of the sixteenth and seventeenth centuries, such as *Il mondo savio e pazzo* (1552) by Anton Francesco Doni, *Città del sole* (1602) by Tommaso Campanella, and *New Atlantis* (1624 in Latin, 1627 in English) and *History of Life and Death* (1623) by Francis Bacon.

8 Georges Minois, *Histoire de la vieillesse en Occident. De l'Antiquité à la Renaissance* (Paris: Fayard, 1987).

ities, caloric energy and humidity. With age it is very important to economise bodily heat and, in particular, humidity; it is thus essential that in old age male semen be carefully saved, because every ejaculation constitutes a loss and a detraction which results in a shortening of life. According to Aristotle, women live longer than men because, unlike men, they are less dedicated to lust.⁹

The quest for longevity in utopia bears evidence to a pervasive obsession with time. Every utopia begins with an act of separation and distancing from historical time, but the creation of a new history does not stop the flowing of time and the ineluctability of the end. Thus the utopian writer devises strategies able to fix, even freeze, the state of perfection and harmony which, once reached, must not know the corruptibility and decay of all things human. The rational principle that rules every aspect of the real is inevitably subject to the *angst* and pressure of time. Setting itself outside history, utopia freezes temporality. Examined through a magnifying glass, perfection reveals cracks and fissures: the aspects of reality subject to ageing and death generate unbearable fear.

A pervasive feeling of finitude haunts *La Terre Australe Connue* by Gabriel de Foigny (1676). The positive model he offers by portraying a universe populated by Australian hermaphrodites, who softly die eating the fruit of a certain tree, is scattered with disquieting signs. At the end the utopian universe is explicitly overturned. The virgin and immaculate androgynous body of the Australians remains pure, neither subject to the biological cycles nor to the signs of transformation. Their body, like that of the androgynous Adam, should mark a reconciliation between physical and cultural antinomies. Physical integrity thus appears to counteract the triumph of corruption and death. However, repressed elements recur in the description of the hermaphrodites' everyday life, characterised by materiality, fear of death and vital combustion. They have a phobic disgust of food, which leads them to eat secretly in order to hide what they judge to be an excessively bestial act. The dichotomies of body/mind and life/death appear again as taboos and vetoes. The abolition of anxiety about the end is only apparent and the tragic opposition between love of oneself and death burst out violently. The hermaphrodites commit suicide because they are victims of their own narcissism: a love founded on nothing that leads to entropy. Their ataraxy reveals a latent but dissimulated restlessness, because the body with its functions still represents an element capable of causing disorder.

In Swift's *Gulliver's Travels* (1726) the senseless lust for immortality is cruelly satirized in the description of the Struldbruggs, the creatures whom Gulliver meets in his voyage to Luggnagg. Common people hate and despise them, because their eternal life does not include endless youth or removal of bodily and

9 Fortunati, 'La vecchiaia in Shakespeare tra mito e scienza', in *Il testo letterario e il sapere scientifico*, ed. by Carmelina Imbroscio (Bologna: Clueb, 2003), pp. 177–190.

mental decay, but entails a grim existence, weighed down by their eternal decrepitude and all its attending evils.

The chilling description of the Struldbruggs anticipates an idea that will become central to the conception of old age in modern times. By means of a skilled ironic technique, in these pages Swift deconstructs the concept of immortality by using the myth of Tithonus who through the intercession of his bride Aurora received from the gods immortality, but not eternal youth. Tithonus became so decrepit and wrinkled that he turned into a cricket. Similarly, as the years pass not only do the Struldbruggs lose their teeth and hair, but they also become incapable of distinguishing the different tastes of food, thus turning into fearful individuals.

They were the most mortifying sight I ever beheld, and the women more horrible than the men. Besides the usual deformities in extreme old age, they acquired an additional ghastliness in proportion to their number of years, which is not described.¹⁰

Swift realized that in a world dominated by a progressive conception of time, in a world that continually changes and rejuvenates itself, old age is no longer a repository of knowledge but turns into an element of delay, inadequacy, and anxiety about the novelties that cannot be controlled in their rapid and harassing succession. The old man lags behind, alone, deprived of everything that passes by. Old age is thus not only a condition of decrepitude, but also a lonely exile. The scenario Swift envisions will later be defined as ‘cultural ageing’¹¹, a period of life characterised not only by biological decadence, but also by difficulty in finding one’s way in a system of unknown signs and new symbols.

William Morris’s positive utopia contains a few important anticipations of concerns which science would also tackle in the second half of the twentieth century. In *News from Nowhere* (1890) Morris presents the idea that old age is not only a biological, natural fact, but a cultural event significantly shaped by the lifestyle and attitudes of the whole social community.¹² Ageing is thus strictly related to the environment in which one lives. Nowhere is peaceful and unpolluted, because social conflicts have been overcome and factory waste eliminated, the atmosphere is clear, the waters of the river Thames are clean and people age in the best of ways. In line with the great utopian tradition of Plato and More, Morris posits a society in which old people are not only held in high esteem because they are the repository of wisdom and historical memory, but also play a specific role. In his journey across the London of the future William

10 Jonathan Swift, *Gulliver’s Travels* (London: Penguin, 1967), p. 258.

11 For the notion of cultural ageing see Jean Améry, *Über das Altern: Revolte und Resignation* (Stuttgart: Klett, 1968).

12 *Vivere a lungo e bene. Dalla vita sobria di Alvise Cornaro ai giorni nostri*, ed. by Renzo Scortegagna (Padova: Marsilio editore, 2004).

Guest meets two antithetical elderly people: the first, Old Hammond, is the guide who tells the traveller about the historical events that led to the new socialist society; he preserves the sense of history, being a living witness of both the old and the new society. The figure of Old Hammond is positive since he is not 'aged' culturally: he is not backward and knows perfectly how to get around in the new society. Unlike the elderly who do not know how to adapt to the new, because they can no longer control it, Hammond has fully understood the sense of change. The positive figure of a wise and intelligent old man still looking to the future is opposed to the grandfather of young Ellen, who is unhappy and irritable. He belongs to the small number of 'grumblers', the malcontents who miss the old epoch because they have aged culturally. While stressing the disconnection between this old man and the surrounding environment, Morris underlines the important relationship between ageing and the social and political milieu. When the Utopians estimate how old William Guest can be, it is emphasised that age is a relative concept; it is the age which we act and demonstrate that matters. The Utopians maintain that ageing is strictly related to the environment. Therefore, although William Guest is only fifty-six years old, to the Utopians he appears to be eighty, precisely because he has lived in a society which is profoundly sick, both socially and morally. At the end, when William Guest's dream comes to an end, he meets a beggar, whose body bears the signs of decrepitude, a figure juxtaposed to the harmonious and fascinating creatures he left behind. This old man is an allegory of capitalist society in which life conditions are inhuman and devastating.¹³

IV. Longevity and Globalisation: the End of Utopia?

Nowadays the issue of longevity entails viewing a globalised perspective.¹⁴ As regards human lifespan, the planet is highly heterogeneous: lengthening of lifespan is mainly the concern of the most economically developed countries, but according to demographic projections it has already begun in China and India, and will bring about huge consequences in the next fifty years. Unfortunately, a large number of countries have populations with a short average lifespan, little longer than a few centuries ago in Europe. Such inequality raises political, ethical, and philosophical issues related to heterogeneous globalisation. There are controversial connections between scientific discoveries and the capitalist

13 Fortunati, 'Il mito dell'eterna giovinezza e il tema della vecchiaia nell'opera di William Morris', in *Pellegrini della speranza (Scritti in onore di E. Schulte)*, ed. by Adriana Corrado (Napoli: CUEN, 1998), pp. 173–187.

14 Franceschi, 'Invecchiamento e longevità nel terzo millennio: prospettive utopiche con qualche problema', *Bollettino delle Scienze Mediche*, Anno CLXXX (2008), 47–68.

market with its ruthless logic, which does not encourage the understanding of research on longevity. Patents on anti-ageing medicine represent a huge commercial business which favours the renewal of the myth of eternal youth and the discovery of the elixir of long life. Phenomena such as the culture of fitness, fuelled by the American adoration of all things young, of trans-humanism, of New Age, are not only functional to the capitalist system, but also promote an ideology aimed at banning death. As Marchesini says in a recent book on the notion of post-human:

The elixir appears today under different guises, from plastic surgery, allowing bodies to maintain a state of temporal suspension [...] to expensive cures based on integrators, antioxidants, vitamins, and so forth, capable of transmitting fantastical perspectives aimed towards the universe of youth.¹⁵

On the contrary, the actual reasons that urge researchers to study, for example, the genes of longevity and the mechanisms they control, have nothing to do with the exterior aspects of youth. The aim of biogerontologists is to identify such genes and understand their biological role as tools to avoid, or significantly postpone, major pathologies and disabilities associated with old age. Scientists are neither re-proposing the myth of eternal youth nor searching for the elixir of long life; rather, and more modestly, they are combating disease and premature death.

An alliance between scientists and humanities scholars is fundamental to the development of a new human ontology which takes into account the prospects of life prolongation foreseen by scientific progress. By deconstructing stereotypical representations of old age, it will be possible to re-conceptualise this phase of life informed by new scientific paradigms.

Ageing can no longer be defined as a monotonic decrease of performances; it is a much more complex phenomenon of remodelling where loss and gain of functions occur. From a biological point of view, ageing reflects the continuous adaptation of the organism to reach ever new balances between accumulation of damage and continuous repair.¹⁶ This dynamic view of ageing has a counterpart in Jung's conception of the third age as a new period of development in which the

15 Roberto Marchesini, *Post-human. Verso nuovi modelli di esistenza* (Torino: Bollati Boringhieri, 2002), p. 488, our translation.

16 Franceschi, 'Le basi biologiche della longevità', *Le scienze*, 311 (1994), 52–61; Giovanna De Benedictis and Claudio Franceschi, 'The Unusual Genetics of Human Longevity', *Sci Aging Knowledge Environ* 2006, New Series, 10 (28 June 2006), PE20-PE30; Miriam Capri, Stefano Salvioli, Federica Sevini, Silvana Valensin, Laura Celani, Daniela Monti, Graham Pawelec, Giovanna De Benedictis, Efstathios S. Gonos, and Claudio Franceschi, 'The Genetics of Human Longevity', *Annals of the New York Academy of Sciences*, New Series, 1067 (May 2006), 252–263.

psyche is also subject to continuous remodelling.¹⁷ Nowadays old age is no longer considered a disease, rather it is understood to be a dynamic global process during which both body and mind undergo continuous adaptations to the changes occurring internally and externally.

It is worthwhile stressing that *Homo sapiens* has to face another mismatch. Ageing has not been foreseen by evolution, as most creatures in the wild die precociously as a consequence of famine, predators, and accidents, without reaching old age. Thus the human body has to cope with the ageing process using 'tools' and 'tricks' (biological mechanisms) which have not been selected for survival to old age. This mismatch is at the root of a variety of oddities regarding the phenotype of aged organisms and unexpected findings about the biological basis of (evolutionarily unpredicted) age-related diseases.¹⁸

The complexity of this scenario accounts for the difficulties encountered in what has been called 'the anthropology of old age'. The term was first suggested by Ursula Le Guin, who responded to the new scientific attitude towards old age by exploring various non-traditional attitudes. In her novels – *Planet of Exile* (1966), *The Day Before the Revolution* (prologue to the novel *The Dispossessed*) and the trilogy comprising *The Wizard of Earthsea* (1968), *The Tombs of Atuan* (1971), and *The Farthest Shore* (1972) – she does not impress the stereotypical signs of physical and spiritual decadence upon old people: far from being garrulous, forgetful, irascible, stoop-shouldered, and hard-of-hearing, they are creative and dynamic thinkers, strong individuals who can operate on and

17 Alberto Spagnoli, ... *e diventano sempre più vecchio. Jung, Freud, la psicologia del profondo e l'invecchiamento* (Torino: Bollati Boringhieri, 1995); James Hillman, *The Force of Character and the Lasting Life* (New York: Random House, 1999).

18 Peter Gluckman and Mark A. Hanson, *Mismatch. The Lifestyle Diseases Timebomb* (Oxford: Oxford University Press, 2006); Miriam Capri, Stefano Salvioli, Daniela Monti, Calogero Caruso, Giuseppina Candore, Sonya Vasto, Fabiola Olivieri, Francesca Marchegiani, Paolo Sansoni, Giovannella Baggio, Daniela Mari, Giuseppe Passarino, Giovanna De Benedictis, and Claudio Franceschi, 'Human Longevity within an Evolutionary Perspective: The Peculiar Paradigm of a Post-reproductive Genetics', *Experimental Gerontology*, 43, 2 (February 2008), 53–60; Enzo Ottaviani, Davide Malagoli, Miriam Capri, and Claudio Franceschi, 'Ecoimmunology: Is There Any Room for the Neuroendocrine System?', *Bioessays*, 30, 9 (September 2008), 868–874; Claudio Franceschi, Fabiola Olivieri, Francesca Marchegiani, Maurizio Cardelli, Luca Cavallone, Miriam Capri, Stefano Salvioli, Silvana Valensin, Giovanna De Benedictis, Angelo Di Iorio, Calogero Caruso, Giuseppe Paolisso, and Daniela Monti, 'Genes Involved in Immune Response/inflammation, IGF1/insulin Pathway and Response to Oxidative Stress Play a Major Role in the Genetics of Human Longevity: The Lesson of Centenarians', *Mechanisms of Ageing and Development*, 126, 2 (February 2005), 351–361; Armand M. Leroi, Andrzej Bartke, Giovanna De Benedictis, Claudio Franceschi, Anton Gartner, Efsthathios S. Gonos, Martin E. Feder, Toomas Kivisild, Sylvia Lee, Nesrin Kartal-Özer, Michael Schumacher, Ewa Sikora, Eline Slagboom, Mark Tatar, Anatoli I. Yashin, Jan Vijg, and Bas Zwaan, 'What Evidence Is There for the Existence of Individual Genes with Antagonistic Pleiotropic Effects?', *Mechanisms of Ageing and Development*, 126, 3 (March 2005), 421–429.

change the future of their world. In their last moment of life they are not reminiscing about the past but looking ahead to the morrow. For them old age is a dynamic interplay of opposites in which death heralds new beginnings. In the societies Le Guin sets in outer space and on other planets the elderly are not segregated and still have dialogues and profitable interchange with young people. Le Guin adapts Jung's Puer/Senex archetype in the difficult but possible attempt to restore it psychologically. Even in their final stages of life, old people are able to make important contributions, initiate change and offer innovative viewpoints. Le Guin's fantasy and science fiction suggest that the negative manifestations of old age can be prevented by actively living. She also stresses that ageing is a complex phenomenon from a biological point of view, one that reflects the continuous adaptation of the body in order to constantly reach a new general equilibrium.

Successful ageing as defined by the well-known zoologist and ethologist Desmond Morris in 'Perché l'uomo potrebbe essere immortale' ['Why Man Could be Immortal'] disregards either fashionable fitness regimens or scrupulously balanced diets; it entails eating well and possessing irony, a sense of humour, and a lively interest in the world at large. Morris found these qualities years ago, when he visited the famous centenarian Madame Calmant, one of the longest lived persons ever, who died at the ripe age of one hundred and twenty two years. He then comments on scientific advancement:

It is improbable that in the immediate future genetic manipulation will reach levels allowing the swindling of death itself, and certainly this will not happen during my existence. What I mean to say is not that it should happen, but that it could. The progress of science is so rapid that what today may seem science fiction in a few decades could be an acquired fact.¹⁹

Morris observes that science has accepted the challenge of finitude which so frightened ancient wisdom. The core of the problem is the capacity man may have to modify himself. One of the most advanced yet disquieting questions is what will remain of the *Homo Sapiens* handed down to us by biological evolution. It would seem that the findings and perspectives of science have finally surpassed utopia. Paradoxically, science now represents both the completion and end of utopia.²⁰

19 Desmond Morris, 'Perché l'uomo potrebbe essere immortale', *La Repubblica*, 10 Aprile 2008, p. 1.

20 Franceschi, 'Utopie et Science', in *Histoire transnationale de l'utopie littéraire et de l'utopisme*, pp. 1087 - 1095.

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