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Abstract

We live, according to some, in the century of biology where we now understand ourselves in radically new ways, as the insights of genomics and neuroscience have opened up the workings of our bodies and our minds to new kinds of knowledge and intervention. Is a new figure of the human, and of the social, taking shape in the twenty-first century? With what consequences for the politics of life today? And with what implications, if any, for the social, cultural and human sciences? These are the issues that are discussed in this paper, which argues that a new relation is required with the life sciences, beyond commentary and critique, if the social and human sciences are to revitalise themselves for the twenty-first century.

Keywords: Human, biology, body, brain, social, ethic

Introduction

My work over many years has centred on one question – what kinds of creatures do we think we are, us contemporary human beings? It is also concerned with two further questions which flow from this: how have we come to understand ourselves in these ways, and with what consequences? The social and human sciences have had their own views, often implicit, about the 'nature' of the human beings whose social lives they study. But today, once again, they have to negotiate their relationship with 'biology', in two senses: biology as the field of positive knowledge of living beings that we give that name, and biology as the reality of those beings themselves – humans who are, after all, animals, living creatures, primates; who are born, live, sicken and die. To think of the human as animal: this has long been associated with essentialism, determinism, reductionism, fatalism; with the naturalisation of human delinquencies from sexism to warfare; and with a bloody legacy of horrors from racial science to eugenics. But in what some have termed 'the century of biology' (Venter and Cohen, 2004), this relationship is being reposed. It is being reposed in politics, in the life sciences and in the human sciences. Contemporary biopolitics centres not on death but on 'life'; that is to say, it is organised around dilemmas concerning human vitality: human rights to life (a dignified life, a quality of life), the equality of all humans as particular kinds of

[1] This is the keynote address delivered at the Knowledge/Culture/Social Change International Conference at the Centre for Cultural Research (now Institute for Culture and Society), University of Western Sydney, on November 9, 2011. An earlier and less developed version of this paper was given as my inaugural lecture for the Martin White Professorship of Sociology at the London School of Economics and Political Science in March 2011. I dedicated that inaugural lecture – which as it turned out was also my valedictory lecture at the LSE – to the memory of two inspiring and generous transdisciplinary intellectuals who knew so much about the relations of the natural and social sciences, Paul Hirst and Roy Porter – they are much missed.

living creatures (human rights), the value of life, the future of life, and what can be done to the lives of some to facilitate the lives of others (pre-implantation genetic diagnosis, stem cells, organ transplants, donations of body parts) (Rose, 2007).

This focus on the vitality of the living body is also becoming central to the human sciences. Nowhere was 'the discursive turn' more problematic than when debates over 'the body' seemed to deny any powers to the bloody thing itself. But over the last decade, a number of social theorists and feminist philosophers have come to realise that it is not reactionary to recognise the reality of our fleshly nature, and to examine the possibilities and constraints that flow from it (Grosz, 1994; Braidotti, 2002; Massumi, 2002; Wilson, 2004; Thrift, 2007; Blackman, 2008; Blackman, 2010). Along similar lines, a radical movement in philosophy is rethinking the place of the animal in contemporary thought; rethinking the founding distinction of the human sciences between us tool makers, sign makers, language speakers and other animals (for example Haraway, 1991; Wolfe, 2003; Daston and Mitman, 2005; Haraway, 2007; Calarco, 2008). No longer are social theories thought progressive by virtue of their distance from the biological. Indeed it often seems that the reverse assumption is more common – 'constructivism' is passé; the linguistic turn has reached a dead end; and a rhetoric of materiality is almost obligatory.

Many things have led to this reframing of the human. Some have to do with the cycles of theoretical fashion in the human sciences. Some undoubtedly stem from the sense of our precariousness as a species in the face of ecological threats and climate change. Others arise from a belief that the embodied nature of human beings generates creative forces that can lead to political resistance and change. Some of this work makes reference to developments in the life sciences. However most authors derive their instructions on bodies and brains from philosophy and, when they do turn to biology, there is a tendency to select only those themes that match their theoretical or political aspirations. Human biology is not always as progressive as such theorists would like. But nonetheless, the thought styles of contemporary biology do offer the opportunity for a new relationship between the human sciences and the life sciences. As I have been working on developments in the life sciences over the last decade, it is with three features of that biology that I wish to begin.

Firstly, the remarkable flowering of the life sciences – in genomics, in our understanding of the cell, in neuroscience, in synthetic biology. This research – not least through the ever-expanding use of animal models to explore human capacities and pathologies, and the reposing of evolutionary processes in molecular terms – reveals multiple affinities between humans and other creatures. It raises questions about our similarities and differences with other animals, but in a different manner from sociobiology. The styles of thought of the contemporary life sciences combine the experimental reductionism that has always been anathema to the human sciences with an open dynamism that is less familiar. On the 'reductionist' side of things, we have seen the rise of a molecular and neuromolecular style of thought that analyses all living processes in body and brain in terms of the material properties of cellular components: DNA bases, ion channels, membrane potentials and the like. This molecular vision of life can be traced to the 1930s. It was given great momentum by developments in molecular biology that followed Crick and Watson's work in the 1950s, and the invention of neuroscience by Francis Schmitt and others in the 1960s. It has been made even more powerful by its convergence with the digital technologies of the information age – with their capacity for the rapid processing of vast amounts of information – and its simultaneous distribution to a dispersed transnational research community via the internet.

Yet alongside this reduction, which seeks to understand the vital processes of organs and organisms one cell and one molecule at a time, another style of thought has taken shape. This construes vital properties as emergent, and living organisms as dynamic and complex systems, located in a dimension of temporality and development, and constitutively open to their milieu – a milieu that ranges in scale from the intracellular to the psychological, biographical, social and cultural. One of the key conceptual struggles in the life sciences concerns the relations between these two visions (sometimes characterised as 'top-down' and 'bottom-up'), nowhere more so than in relation to the brain. The human sciences could play an important role here, if they were willing. But that is not my topic today.

These thought styles from the sciences of life find their place in a novel biopolitics. One fundamental change needs to be recognised: today, to deem something biological is not to assert destiny or fatalism, but opportunity. As the corporeal becomes construed not as mystery but as molecular mechanism, organisms – including human organisms – seem amenable to optimisation by reverse engineering and reconfiguration at this molecular level. Hence, secondly, we have seen the 'technologisation' of vitality in the life sciences. It is not only that to know is to intervene, although this is crucial. Today one knows life only by intervening in it. Gaston Bachelard's view is as true as it ever was: a concept "has become scientific according to the proportion to which it has become technical, to which it is accompanied by a technique of realization" (quoted in Rheinberger, 2005: 320–21). Intervention is not just to know, but also to do: knowing life at the molecular level has been intrinsically related to an enhanced capacity to act upon it at that level. Life seems to have become amenable to intervention and open to projects of control. Developments such as Ian Wilmut's cloning of Dolly by inserting the nucleus of a somatic cell taken from the mammary gland of one sheep into an unfertilised enucleated egg cell from another (Wilmut and Highfield, 2006) and Craig Venter's creation of Synthia – a bacterial cell controlled by a chemically synthesised genome (Gibson et al., 2010) – have led some to suggest that nothing is biologically impossible, and only our own imagination – and our own ethical and social constraints – set the limits on what we can do to our vital existence and that of other animals. Wilmut subtitled his autobiography "Dolly and the Second Creation", and Venter, too, is routinely credited with such beliefs. But even without such fantasies of omnipotence, a global bioeconomy has taken shape around the manipulation of biology. Biological knowledge has become highly capitalised. Paths to the creation of biological truths have been shaped by promises and predictions of the biovalue to be harvested: enhanced crop yields, bioenergy, bioremediation, and, of course, advanced medical and health technologies based on biology. Companies, nations and regions compete in this global bioeconomy, arguing that developments such as synthetic biology will underpin a new industrial revolution welding together the dreams of patients, politicians, researchers and capitalists in what Carlos Novas (2006) has termed a 'political economy of hope'.[2]

There is much value in the work we now do to maintain ourselves as living beings. The medical and healthcare segments are the most lucrative for the global biotechnology market: in 2008 they generated 69% of the market's overall revenues (Research and Markets, 2011). By 2011, Ernst and Young estimated that the global market for pharmaceuticals was around $500 billion; for medical devices it was about $150 billion. This is one indication of my third condition: the salience that the biological and the biomedical has achieved in practices of self-management and self-governance. We understand ourselves in the language of

[2] The global biotech industry is forecast to have a value of $305.7 billion, an increase of 41.3% since 2008, with around 60% based in the USA, but China, India, Japan and Brazil are now competing hard (Research and Markets, 2011).

biomedicine; judge ourselves in terms of the norms articulated by biomedical experts; modulate our bodies and our minds with expensive drugs shaped by these experts' belief systems; replace our worn-out parts with artificial hips and knees; look up our symptoms on the internet; check our disease susceptibilities with personal genomic tests and commercial body scans; think about reducing our risks with diet and exercise; worry – individually and collectively – about Alzheimer's and the dementias and take up Sudoku and mind gyms in the belief that if we act this way, we may be saved. We have become what I have termed elsewhere 'somatic individuals' (Novas and Rose, 2000).

Over the twentieth century – and in the countries of Europe, North America and their colonies since the nineteenth century at least – our sense of ourselves was profoundly shaped by the rise of the psy sciences, and these positive knowledges of the individual became tied up with our form of life, our ways of governing ourselves (Rose, 1999). It is not surprising, then, that such psychological conceptions of personhood became the unspoken premise of the social and human sciences. But as the twentieth century came to an end, another ethic came to the fore, linked to the belief that our individuality grew out of and was mapped onto our fleshly existence in certain crucial ways (Rose, 2007). In some respects, our bodies *were* our selves, although not quite in the sense meant by the Boston Women's Health Collective four decades ago (Boston Women's Health Book Collective, 1978). Of course, there is nothing new about an emphasis on bodies, their management and their sculpting, the averting of disease and the maintenance of health (Porter, 1999). But today this somatic ethic is underpinned by an unparalleled truth discourse about the human body arising from the life sciences and biomedicine. It is disseminated through a network of injunctions from experts of the somatic; deemed to be a matter of state as well as of the individual; and embedded in multiple sites from home and school to workplace and leisure.

Bookshelves groan under the weight of popular science discussing this new knowledge, and speculating about the implications of our capacity to understand and control everything from our cognitive abilities to aging and death. The belief in the implications of advances in the life sciences for our everyday lives is exacerbated by the 'translational imperative': the obligation on researchers in biology and biomedicine to make promises to funders, to research assessors, to their university press offices and to the media that the results of their work on the fly, the worm, the mouse or the macaque will soon reach the clinic, usually 'in three to five years'. This is a fantasy of course. The more we know, the more we realise how little we know. Each dream of control over body or mind is soon met with downsides, side effects and disappointments (nowhere more so than in my own area of special interest, psychiatry and mental health). When it comes to human vitality, there is much that cannot be controlled or re-engineered according to our own desires; much that does remain 'biologically impossible'. There is no simple progression from our ability to tackle simple problems to the ability needed to tackle complex ones – no golden path to ever-expanding powers – but rather, as we shall see later, many distinct and substantial biological barriers that are hardly understood, let alone overcome.[3] Further, to state the obvious, the life sciences do not constitute a homogeneous field, but a tangle of diverse and often incompatible disciplines and sub-disciplines, theories, concepts, arguments, bodies of evidence, experimental set-ups and so forth, riven with controversies over some rather fundamental issues. Nonetheless, despite the exaggeration, the idea that all living organisms (including humans) can be understood as biological beings – that their nature is not a matter of mystery

[3] Jack Price, a neuroscientist, has recently argued this eloquently in relation to his own specialism: brain reconstruction after damage from stroke and neurodegenerative diseases (Price, 2011).

but of mechanism – lies at the heart of the claim that we are in 'the century of biology'. As does the further claim, even if it remains implicit, that so much that is specific about our humanity – our individual existence and collective arrangements – can be understood in terms of our characteristics as specific kinds of living beings. If we are increasingly coming to think of ourselves as biological creatures, how should those from the human and social sciences respond?

Biology and sociology

Biology and sociology were born close together in the first half of the nineteenth century. Biology in 1802 as the name for a new science of living entities, dividing nature into two 'kingdoms': those possessed of life and those without it. Sociology, as the scientific study of the development of human societies, is conventionally ascribed to Comte in 1839. From its birth, sociology has been haunted by biology. Across the nineteenth century there was a double move between the two. On the one hand, attempts were made *to differentiate* the sciences of the moral or social order from the strictly biological; to argue that the laws of association amongst human beings were 'sui generis'. And, on the other, attempts were made *to model* sociology on biology; to think of the social order as in some way or other analogous to the biological realm, with structures, functions and organic connections between parts; subject to laws of development that could be described in the language of evolution, and having a potential only possible for living entities: to be normal or pathological, healthy or sick.

While the styles of thought of the biology of the nineteenth century infused the new science of sociology, the social sciences grew, at least in part, because of their biopolitical role. By this I mean nothing more fancy than their claim to be able to provide the 'know-how' to govern those aspects of the individual and collective lives of human beings arising from their nature as living beings: racial types; sexual desire; procreation; disease and epidemics in towns and cities; and of course the whole problem of the population – its rates of increase and decline, the consequences of differential fertility, degeneracy, eugenics… One only needs to list them for the intensity of the relations between the social sciences and the government of humans as biological, vital, living creatures to become clear. This question was central to sociology as it became a discipline in the first half of the twentieth century. Despite much vagueness as to what sociology actually was (Abrams, 1981, quoted in Bulmer, 1985: 4; Rocquin, 2006), the sciences of society in the first half of the twentieth century were haunted by biology. This was not just in the notion that society could be pictured as a kind of organism, or in the recurring themes of social evolution. Their recurrent question was biological – a question of population. Population was often addressed in terms of eugenics, though not always as we think of it now. At the London School of Economics (LSE), for example, William Beveridge, as Director of the LSE from 1919 to 1937, sought funding for a Professorship in "social biology (genetics, population, vital statistics, heredity, eugenics and dysgenics)" to "complet[e] the circle of the social sciences".[4] But Beveridge appointed Lancelot Hogben – a fierce opponent of eugenicists – because he believed that population problems could only be properly understood once the "rubbish about allegedly biological

[4] The relations between biology and sociology across the first half of the twentieth century are worthy of note. Patrick Geddes, who was a co-founder of the Sociological Society in 1903 with Victor Branford, among others, was originally trained as a biologist like Alexander Carr-Saunders and Lancelot Hogben. Tom Harrisson, founder of Mass Observation, was an ornithologist, and Bulmer (1985: 11) describes Mass Observation as a kind of social bird-watching.

laws of population growth" was sorted out: "human genetics was a morass of surmise and superstition…The rationalisation of race prejudice by appeal to biological principles was then plausible only because human genetics was so immature" (Beveridge, quoted in Keynes, 2002). Alexander Carr-Saunders, successor to Beveridge as Director of LSE and a key figure in many official bodies exploring the question of population,[5] wrote extensively on eugenics and was president of the Eugenics Society between 1949 and 1953. While he was consistently critical of that form of eugenics which "calls to mind proposals for getting rid of persons with undesirable innate qualities and for encouraging the bringing into the world of well-endowed children" (Carr-Saunders, 1926: 18), he concluded his Hobhouse Memorial Lecture in Cambridge in 1942 under the title 'The Biological Basis of Human Nature':

> It is nearly eighty years since Galton set the eugenic movement on foot. He may…have been overhasty [but] it appears that we now have sufficient information upon which to begin to take action if we so wish…The Romans, it has been said, prided themselves on being the degenerate descendants of the gods; we pride ourselves on being the very creditable descendants of apes. We shall cease to be a credit to our ancestors if we allow our genetic inheritance to deteriorate (1942: 24).

When John Maynard Keynes presented Carr-Saunders with the first Galton medal in 1946 – 1946! – Keynes described Galton as "the founder of the most important, significant and, I would add, *genuine* branch of sociology which exists, namely eugenics".[6]

From the 1950s, things changed in the light of the murderous consequences that seemed to be associated with conceiving of human qualities in biological terms. Many post-war continental philosophers argued that Nazi Germany was characterised by a spiritualisation of the biological and a biologisation of the spiritual, in which the person and the body became seen as one and the central task of politics was shaping the biological life of the race and the nation – an animalisation of human character, will, value and virtue. It is true that biological metaphors remained common in the sociologies of the 1950s and 1960s: for example, in Talcott Parson's fascination with ideas of organic and homeostatic systems, and his metaphorical and typological uses of the language of functions and of evolution. However by the 1970s it became sociological common sense that fatalism, determinism, reductionism, sexism – a naturalisation and legitimation of existing relations of power – would follow inescapably from any engagement with the reality of human biology, as either an ontological question (what were humans really like) or as an epistemological one (what can biology tell us about the forms of life that humans have made for themselves). Human biology was relevant, only in that it provided the preconditions for language, meaning and culture whose form and content must be accounted for in non-biological terms. The controversies that flowed – notably over race and intelligence – seemed to confirm this negative judgement on those who imported vulgar biological notions into their diagnoses of the social (Kamin, 1974; Lewontin, Rose and Kamin, 1984), as did the simplifications of sociobiology, evolutionary psychology and doctrines of 'the selfish gene' (Rose and Rose, 2000). The evidence of two centuries seemed to place references to the biological on the side of a reactionary politics that tied humans to a fixed nature. To be progressive – to aim for social change, justice and equality – required keeping biology in its place.

[5] He was Chairman of the Population Investigation Committee from 1936, and Chairman of the Statistics Committee of the Royal Commission on Population from 1944 to 1949.

[6] Quoted in Blacker (1967: 368). Keynes describes Carr-Saunders as being "by common estimation to-day the most distinguished sociologist in the country" (ibid.).

And yet, as the twentieth century closed, there were signs that this sociological common sense was coming into question.[7] While many initial concerns with the theme of embodiment elided that fleshy, bloody, animal thing itself (famously Butler, 1993), the living body was directly at issue in the many ethnographic studies that traced the ways in which biological knowledge was managed, lived, employed, contested and intricated in the lives of women in reproduction, kinship and parenthood (Martin, 1987; Franklin, 1995; Rapp, 1999), and in others that examined the new relations between biological knowledge, medical intervention and the management of bodies, in sites ranging from HIV and AIDS to brain death (Martin, 1994; Epstein, 1996; Lock, 2002). It became common sense to argue that the capacities of 'the body' were shaped by cultural expectations; that its normalities and pathologies were 'socially constructed'; and that features once considered natural – gender, sexuality, race, age, disability and so forth – were actually performed according to cultural scripts.

As noted earlier, as the twentieth century closed, many participants in these debates became critical of their overly discursive nature and sought to return to some version of materialism (Bennett, 2010). The tortuous attempts to recognise the 'agency' of non-human entities such as scallops, bacteria, climate and the like – hardly startling news to any social historian – speaks volumes about the wayward conceptual pathways previously taken in the field of science studies. Others sought more directly to reintegrate themes from biology and, in the words of Elizabeth Grosz, "to redress the foreclosure, the denial, of the biological forces that press on and produce life, and thus, ironically, to overturn the repression of materiality in its most complex forms that has dominated the humanities and social sciences in their exclusive focus on cultural construction at the expense of natural production" (2005: 44). Thus Grosz herself has turned to Darwin and evolution to reconsider ontology, and to help her conceive of life as a "ceaseless becoming" in which "essence is transformed into existence, the past and the present are superseded and overwritten by the future" (ibid.: 36). Elizabeth Wilson has looked to Silvan Tomkins' conception of universal innate affect systems, together with elements drawn from theories of neural networks and more visceral versions of psychoanalysis, to reclaim aspects of biology for feminism, as in her project for 'gut feminism' which aims to conceptualise the 'sedimentations' of the neurochemical, affective, ideational and social in both the experience of depression and in its pharmacological treatment (Wilson, 1998; Wilson, 2004; Wilson, 2010; Wilson, 2011).

Others have been less careful in their borrowing from the biological. This is especially the case with those who refer to biological arguments to support their claim that human beings are not individuated, conscious and rational, but rather enmeshed in sensations and contagions, and shaped by affective and non-cognitive force fields (Connolly, 2002; Massumi, 2002).[8] For example, Brian Massumi alludes "fleetingly" – as Ruth Leys (2011)

[7] Of course, in this paragraph, I can give references to only a fraction of the books published on these topics!

[8] In the remarks that follow, I have drawn on Ruth Leys' excellent analysis (2011) of the political claims that those such as Massumi and Thrift make for their approach to affect. Leys takes exception to the apparent denigration of meaning and intentionality in this work, which she traces back to Tomkins and others who see affects as comprising a set of fixed autonomic patterns, each triggered by various external stimuli, but which are prior to any attribution of meaning to those stimuli. Leys rightly criticises the evidential base for the argument that meaning comes later, if at all, as the subject seeks to give a plausible interpretation to him or herself of their affective state. While this is not the place to discuss her alternatives, it is clear that the claim that cognition and emotion form distinct faculties is neither conceptually nor neurobiologically supportable, and that there is no reason to accept the suggestion that the mental is identical to the cognitive, and the cognitive is formed of language like propositions. For another excellent critique of affect theory, on which I have drawn, see also the detailed account of the selective use of Antonio Damasio, Joseph LeDoux and Daniel Stern provided by

puts it – to various findings concerning the role of the autonomic nervous system supposed to derive from contemporary neuroscience, and supports his belief in the bodily character of thought with reference to the highly dubious conclusions that Benjamin Libet draws from his experiments on volition (Libet et al., 1983; Libet, Freeman and Sutherland, 1999). He uses Libet's argument – based on a highly simplistic laboratory set-up – that there is a half-second delay between a decision being manifested in brain process and it entering conscious awareness to give empirical support to a philosophical argument drawn from Spinoza and Deleuze, with added support from Gilbert Simondon (Massumi, 2002).[9] Libet's bizarre reasoning, and extrapolations to general claims about the absence of free will, remain unquestioned. Nigel Thrift also frames his 'non-representational theory' by criticising the way social theory previously rejected biology: "distance from biology is no longer seen as a prime marker of social and cultural theory…It has become increasingly evident that the biological constitution of being...has to be taken into account if performative force is ever to be understood, and in particular, the dynamics of birth (and creativity) rather than death" (2007: 174).[10] This is asserted via a mind-bending amalgam of the usual suspects from philosophy – Agamben, Bergson, Deleuze and Guattari, William James, Spinoza and Whitehead – together with references to Simondon and von Uexküll and a few biologists or neuroscientists: LeDoux, Damasio, Ekman, the famous autist Temple Grandin, Libet and, of course, Francisco Varela. Only, it seems, by recognising the true nature of human corporeality and the power of the affective will we be able to free ourselves from an overly intellectualist and rationalist account of contemporary politics, economics and culture; only then will we understand how we are bound in to our beliefs and desires through processes that operate at a non-conscious, non-intellectual level; and only then will we be able to grasp, and perhaps to intensify, the forces that inspire resistance, creativity and hope.

Most of the advocates of these new ways of thinking use such pilferings from biology to justify a conceptual framework that satisfies their pregiven socio-political affiliations. In a strange form of conceptual gerrymandering, arguments from the life sciences seem to evade critical interrogation where they give support to claims that derive from a pre-existing kind of philosophical ethopolitics. Is there more intellectually honest way to connect the human sciences and the life sciences? A few sociologists have argued against the view they attribute to 'discourse theorists' – that human bodies are infinitely malleable by culture – and called for a 'material-corporeal' sociology that thinks in terms of an interplay between the biophysiological properties of human bodies, their shaping by social practices, and their organisation by cultural and linguistic forces which shape individual lived experiences and identities (Williams, 1999; Newton, 2003). But such modest sociological endeavours to discuss the role of such issues as emotion, stress and social inequality in accounting for ill health; to muster evidence from research on psychosomatic conditions and the role of hormones and the immune system, find it difficult to gain much traction. They tend merely to repeat the general claim that human bodies are simultaneously biological and social. So is there another way of approaching this issue of the relations between the human sciences and biology? Might things look different if we approached it from the direction of the life sciences themselves?

Papoulias and Callard (2010). Thanks to Lisa Blackman for thoughtful advice on the current state of affect theory, which forms the topic of her forthcoming book *Immaterial Bodies*.

[9] A critical analysis of Libet's claims can be found in Rose and Abi-Rached (forthcoming).

[10] He cites the work of Stephen Turner and Christine Battersby in support here; this passage is also quoted by both Papoulias and Callard (2010) and Leys (2011).

Evolved biology, humanity

Of course, even in the 1970s and 1980s, some sociologists sought to recognise the biological nature of human beings without lapsing into reductionism and determinism. Thus *Social Relations and Human Attributes*, written by Paul Hirst and Penny Woolley and published in 1982, opens with a quote from the evolutionary biologist Theodosius Dobzhansky (Hirst and Woolley, 1982).[11] Human society and culture, says Dobzhansky, are the product of the biological evolution of our species, but "human phenomena" – Dobzhansky mentions intelligence, the capacity to use linguistic symbols, and culture – "affect the biological evolution of man so profoundly that it cannot be understood without taking them into account…Human evolution is wholly intelligible only as an outcome of biological and social facts" (Dobzhansky, 1955: 320, quoted in Hirst and Woolley, 1982: 1). This is the central theme of Hirst and Woolley's argument. Human attributes are, as they put it, "directly conditional upon man's animal past" (1982: 5). But even human *physical* attributes, such as bipedalism, opposable fingers and thumb, and the size and capacities of the human brain, arise from selection pressures from emerging *human* forms of life. Yet as humans developed their distinctive cultural forms, their attributes have been socially shaped and hence vary greatly between cultures and across historical time.

We have many empirically rich examples, ranging from bodily comportment (styles of walking, marching, swimming), through the manifestation of distress (in physical or mental symptoms and syndromes), to a sense of personhood (as individual, unique, autonomous). Indeed, as we can see from the numerous examples of children brought up in the wild without human contact, some attributes that we think of as quintessentially human – speaking, sexuality, the sense of self – do not appear at all in the absence of social and cultural shaping. Referring to the work of many anthropologists, psychiatrists and doctors from the first half of the twentieth century, Hirst and Woolley point out not only that cultures shape, in fundamental ways, the forms of expression of mental distress (Yap, 1951), but also that one can indeed be brought to death by one's genuine belief that one has been cursed (Cannon, 1942). The recognition that the habitus, bodily capacities and fundamental mental categories of humans require formation – that the envelope of the skin does not, by rights, delineate an enclosed, autonomous zone – is by no means new. Thus the human body cannot be the province of the biologists alone: culture, symbolism and the imagination are also constitutive, even when it comes to the organisation and properties of basic musculature, hormonal systems, sicknesses and their cure, its emotional economy, and even its life and death.

In the thirty years or so since Hirst and Woolley wrote their book, these arguments have become even more telling, not least because they mesh with the changing thought styles in the heartland of molecular biology itself. Starting, perhaps, in the 1930s, there was a shift from a molar image of life – of organs, flows of organs, of muscles, of blood and of tissue, represented by the paintings and drawings in anatomical atlases of the eighteenth and nineteenth centuries – to a gaze that envisions the body at the scale of the interactions between molecules (Kay, 1993). The relations of the social and the biological – the selection pressures that human life exerted on human evolution, and the shaping of human attributes by their milieu – have been reposed in molecular terms (Rose, 2001). Biology and culture are not construed as realms external to one another; rather, human biology and human sociality – bodies, brains and milieu – are increasingly having to be conceptualised on the basis that they

[11] Paul Hirst wrote several insightful books on the relations – and differences – between biological and social theory (Hirst, 1975; Hirst, 1976).

are in constant and multiple transaction at the molecular level.[12] And this, in my view, opens some intriguing new possibilities for overcoming the stand-off between progressive thought in the human sciences and the truth discourses of biology.

Consider, for example, the style of thought in 'social neuroscience'. Researchers seek to account for the distinctively *social* form of human existence by identifying evolutionary processes that have selected for the *neural preconditions* of sociality, group formation and even consciousness (Cacioppo and Berntson, 2004; Cacioppo, Berntson and Decety, 2011). Humans, they argue, can become 'social' in the sense of forming co-operative relations with one another because they have the capacity to ascribe meanings to the movements or visible features of others, to ascribe these to their internal mental states, and hence to recognise the intentions and the feelings of their conspecifics. In a key paper from 1990, Leslie Brothers, who was trained in psychiatry and psychoanalysis, famously argued that "while many non-primates (for example, ants) can interact in highly specific ways with others of their kind, it appears that primates, especially those most closely related to ourselves, have developed a unique capacity to perceive psychological facts (dispositions and intentions) about other individuals. This capacity [that she termed 'social cognition'] appears to distinguish primate social behavior from that of other orders…" (1990: 28). Many of those who have developed these ideas suggest that such capacities for social cognition have genomic conditions – that is to say, they are rooted in specific molecular sequences that code for the neurobiological processes that subserve such human sociality. For example, Klaus-Peter Lesch has suggested that a 'polymorphism' in one particular genetic sequence of the serotonin transporter gene, present only in humans and some primate species – which regulates one important neurotransmitter in certain regions of the human brain – has consequences for embryonic development and brain plasticity; in particular "in brain areas related to cognitive and emotional processes" which "transcends the boundaries of behavioral genetics to embrace biosocial science…the potential impact of *5-HTT* variation on social cognition transcends the boundaries of behavioral genetics to embrace biosocial science and create a new social neurogenetics of behavior" (Lesch, 2007: S24–S28). Contemporary neuroscience, that is to say, argues that humans are evolved to be 'social' and that something of the specific forms of human sociality has its conditions in human neurobiology.

Many from the social and human sciences react with horror to this suggestion that our specifically human social capacities have neurobiological bases.[13] At the least, they feel that their space is being colonised; their expertise displaced. But more fundamentally, they suggest that the very nature of human beings is being misunderstood; that instead of understanding humans as uniquely speaking subjects with culture and history, this kind of analysis reduces them to puppets of their brains. They are concerned that in claiming that the relations between our forms of life and those of our animal forbears may not be of fundamental difference but of continuity, we will forget that only humans can express these relations; communicate them with others; build systems of morality, law and civility upon them; and uphold these systems. They fear the consequence of placing humans among the animals. I understand such arguments but find them unconvincing.

[12] One can, and should, think here about the phenomenon of 'placebo', which was the topic of a series of seminars at the BIOS Centre in 2004 organised by Anne Harrington. See also Harrington (1999, 2008) and Wahlberg (2008).

[13] As do some philosophers, for example, Raymond Tallis (2011) and the Wittgenstein-inspired collaboration between the neuroscientist M. R. Bennett and the philosopher Peter Hacker (Bennett and Hacker, 2003).

Of course, there are plenty of examples of simplistic reductionism – Leslie Brothers herself became very critical of the ways in which social neuroscience had developed (Brothers, 2001). There is much to criticise, in particular in the branch of social neuroscience that is enamoured of brain imaging. Brain imaging is characterised by gross over-interpretation of results from imaging experiments in highly artificial laboratory situations, and espouses a kind of 'blobology' which claims that an area of the brain that shows activity in a brain scanner – one containing billions of neurons at current resolution – is the location for this or that human mental state.[14] Imaging technology, however marvellously sophisticated, cannot make up for the woefully simplistic conceptual apparatus of many imagers. Words like 'subserve' and phrases such as 'neural correlates' gesture to the explanatory gap that remains between brain processes and mental processes. Social scientists have given us excellent studies of the theories, premises, algorithms and assumptions that are built into the exquisite machines that produce the images (Beaulieu, 2000; Dumit, 2003) – this is indeed Bachelardian phenomenotechnics in action. It is also a classic example of what Gerd Gigerenzer termed, a long time ago, "tools to theories" in which a tool – here the functional MRI scanner that maps patterns of blood oxygenation in voxels in a three dimensional space, used to produce visual images implying activation in different locales – then becomes the basis for a theory about the activity of the brain itself that each image seems to confirm (Gigerenzer, 1991). Those from the social and human sciences rightly identify the impoverished sense in which 'social relations' are reduced to interactions between dyads that can be experimentally simulated in a laboratory and in a scanner (Cohn, 2004; Cohn, 2008a; Cohn, 2008b).

But critique is not enough, nor are the familiar tropes of constructionism. I think we need a more positive relation to these new understandings of what it is to be human. For example, John Cacioppo's work has focused on the interplay between social interactions – from dyads, through families, neighborhoods and cities, to civilizations – and the brain and nervous system of the individual "through a continuous interplay of neural, neuroendocrine, metabolic and immune factors on brain and body, in which the brain is the central regulatory organ and also a malleable target of these factors…Social neuroscience is the interdisciplinary academic field devoted to understanding how biological systems implement social processes and behavior, and how these social structures and processes impact the brain and biology" (Society for Social Neuroscience, 2010). Further, Cacioppo argues, humans have an evolved human affinity for social life; hence the consequences of human isolation: "The social environment…is fundamentally involved in the sculpting and activation/inhibition of basic structures and processes in the human brain and biology…social isolation or perceived social isolation (loneliness) gets under the skin to affect social cognition and emotions, personality processes, brain, biology, and health" (University of Chicago, 2007). A pre-eminently culturally shaped human experience – not just 'actual' but 'perceived' isolation – configures neural processes at the molecular level and vice versa. Humans can, indeed, be dying for company (Cacioppo and Patrick, 2008). If this is not an invitation to the social and human sciences for engagement in a genuinely transdisciplinary question, it is hard to see what would be. Indeed, perhaps this is an endeavor not that different in intention from Georg Simmel's classic study of mental life in the metropolis (Simmel, [1903] 2002) – even Tarde's

[14] For one really bad example, see Eisenberger, Lieberman and Williams (2003). Hauke Heekeren has suggested that this is like trying to work out how an automobile engine works on the basis of an image gained from a thermal detection device mounted on a geostationary satellite (at a 'neuroschool' held by the European Neuroscience and Society Network in Vienna in 2009). Of course, as Heekeren pointed out at the same event, it is not at all clear what scale *would* be appropriate – it makes no sense to read a newspaper with a microscope, but neither is it sensible to read a book from a photograph of the bookshelf.

studies of crowds (Tarde 1890) that are now so celebrated by our avant garde – except with more evidence!

Genomics and the human condition

The same is true of genomics. I do not need to rehearse the dispiriting and often murderous ways in which genetic explanations have entered human history. But things have changed. Genomics has moved away from a style of thought that looked for single genes for specific characteristics, the 'gene-for' paradigm so criticised by social scientists especially when it claimed to have discovered 'the gene for' a human experience such as homosexuality or bipolar disorder. Instead, a different way of thinking has taken shape in which multiple small molecular variations – for example where a C is substituted by a G, or an A is substituted by a T in the string of bases that make up the genetic code – shape differences in the way an organism develops through constant transactions with its environment – its cellular, organic, biographical, ecological milieu. In the course of these changes, there has been a shift away from determinism towards a probabilistic way of thinking about the relationship between genetics, development, evolution, organism and life chances. Once more, there is a lot of hype about the extent to which these relations are understood. Once more, the social and human sciences need to move beyond hype and its debunking to grasp the new style of thought that is taking shape. On the one hand, at the genomic level, researchers are finding many quite remarkable continuities between even simple animals and humans (Rock et al., 1998; Amsterdam, 2004). Yet when it comes to complex multicellular organisms, let alone primates, the genome is not 'the book of life' or 'the code of codes' – not 'the digital instructions' for making an organism – but something different. The very wise genomic scientist Jacques Monod was very wrong when he famously claimed that what was true for E. Coli – a single-celled bacterium – was also true for the elephant (Jacob, 1995: 290). The challenge is to understand that difference if we are to have a real 'feeling for the organism'.[15]

In a recent review of the impact of the sequencing of the human genome ten years on, the eminent genome scientist Eric Lander (2011) pointed to our growing realisation of how much we now know that we do not know. While only about 1.5% of the genome contains protein coding sequences – the classical 'genes' – a further 6% is evolutionarily conserved, and hence biologically functional, but does not code for protein. This means that there are millions of conserved elements whose function we do not know: perhaps they are involved in the regulation of transcription in development; perhaps they do something completely different. There are thousands of other sequences that also have unknown roles in such processes as cell-cycle regulation or immune response, or in brain processes. Genomic sequences – the 'codes' made up of G, C, A and T – are one-dimensional, but chromosomes in cells have a topography in three dimensions, and we know little about the implications of chromosomal configuration. We may be beginning to understand the role of the millions of polymorphisms in genes – places where a single nucleotide changes – but we know even less about the effects of copy number variation, where whole genetic segments are duplicated many times. We are moving away from the idea that each common disease will share the same genomic basis – even if a complex one – to a model where common diseases are the endpoints of many different, rare genomic variations. Even in conditions where we have a clear idea of heritability, such as certain forms of breast cancer, the proportion explained by

[15] *A Feeling for the Organism* was the title of Evelyn Fox Keller's biography of the path-breaking geneticist Barbara McClintock (Keller, 1983).

what we know of genomics is small and the 'missing heritability' – which cannot be explained by genetics – is high, ranging from 50% in age-related macular degeneration and 20% in Crohn's disease, to around 95% in elevated lipid levels (Manolio et al., 2009). And so on: the more we know, the more we don't know. And the more we know, the more we find ourselves moving away from the idea that the genome is the prime mover or the uncaused cause, towards a style of thought that sees the genome as much affected and shaped by all around it at the same time as it shapes it.

This recognition of the inseparability of vitality and milieu, in genomics as elsewhere, opens a novel role for the social and human sciences. Take, for example, research on epigenetics, best exemplified by Michael Meaney and his group.[16] Since the 1980s with his work on the effects of early experiences on rodent behaviour (Meaney and Stewart, 1979; Meaney et al., 1985), Meaney has explored the effects of maternal behaviour on the developing brains of offspring – what is now termed epigenetic programming. The mother's behaviour towards her pup shapes the expression of genes through altering the methylation of the DNA, and this shapes neuronal development in the pup (Szyf et al., 2007; Szyf, McGowan and Meaney, 2008), which in turn shapes the pup's own behaviour towards its own offspring. By 2009, his group were suggesting that these findings could be translated to humans: there were common effects of variations in maternal care on epigenetic regulation in stressed rodents and in suicide victims with a history of child abuse (McGowan et al., 2009). The brain, it seems, no less than the psyche before it, is open to environmental inputs, and – in yet another blow to ideas of a one-way traffic between genotype and phenotype – these work at the level of the genome, modulating gene expression with consequences that might flow down the generations (Meaney and Ferguson-Smith, 2010). Should the social and human sciences react with horror to such arguments? – I don't think so. Is the argument that stressed rodents should share something with stressed humans a threat to the conceptual and moral delineations of the human? – I don't think so. Should we work with these researchers; help understand the strengths and weaknesses of animal models; seek to model more closely the effects of biography, sociality, culture and history; and guard against the rush to demand immediate impacts in social policies and practices? – yes. This That would be a way of revitalising sociology which would not threaten it but bring it, once more, into alignment with the positive knowledges of the creatures whose relations we seek to analyse.

In all these areas of the life sciences, despite their differences, a style of thought is emerging of constant transactions across the apparent boundaries of the organism that constitute, shape and support vitality, at time-scales from the millisecond to the decade, at levels from the molecular to the cellular, the organ and the organism itself. This is a form of argument that links to, but goes beyond, the important recognition that human capacities such as cognition and affect are 'distributed' – not the individuated property of singular organisms, but constitutively dependent on the webs of interactions among multiple organic processes within and between organisms and other entities in a locale. Of course this thought style operates in very different ways in different disciplinary domains, and there is no single way that the social and human sciences might make their links with them. However it is clear that such links will not be in terms of the relations of 'body' and 'society' – those enticing yet illusory totalities – but at a different scale. Not in terms of 'the body' – or 'the brain' – as a coherent system enclosed by a boundary of skin, but of bodies and brains as multiplicities, of the coexistence and symbiosis of multiple entities from bacterial flora in the gut to the

[16] There are many different definitions of epigenetics and epigenesis. In the current context, the term refers to the ways in which an organism's genome does not merely 'express itself' during development, but is modified from conception onwards as a result of its interaction with extra-genomic factors.

proliferation of neurons in the brain, each in multiple connections with milieu: internal and external, inorganic, organic, vital, historical, cultural, human. There are distributed capacities in milieu which vital organisms themselves partly create and which in turn create them and their capacities.

Relationships between the social and cultural sciences and the life sciences are unlikely to be harmonious. I could give numerous examples from my own work where the human sciences can and must challenge the simplicities of the life sciences when it comes to history and culture. For instance, there are the ways in which neurobiological evidence about the specificity of 'the adolescent brain' (Casey, Jones and Hare, 2008) – which is actually being deployed in the United States in arguments seeking to mitigate the legal responsibility of young people – cries out for an engagement from those who know how historically recent and culturally specific the notion of adolescence itself is. Or there are the ways in which the search for neurobiological markers to ground psychiatric diagnoses misunderstands not only the social role of classification, but the very nature of human mental distress (Singh and Rose, 2009). Or we could consider how arguments about the neural basis of psychopathy, linked to strategies of prediction and pre-emption, need to be reformulated in the light of historical understanding of the category itself, and a social analysis of risk predictions of pathology (Rose, 2010). These are just some small empirical examples of the places where dialogue across the divide, however difficult, is both conceptually significant and practically relevant.

Despite the warnings of those who fear the consequences of placing the human among the animals, this opportunity for engagement places a certain demand on us that is both conceptual and ethical – not that we give up responsibility for that which is biological, or deny its pertinence for our own investigations, but rather that we take responsibility for the biological; for the social shaping of the bodies and brains that constitute us as specifically human animals, whose welfare, in some small way, we hope to foster.

Beyond vitalism?

Some suggest that, in this molecular vision of life, we no longer need any residual 'vitalism' to understand the processes in which life consists (see Bedau et al., 2010). Who needs vitalism when the complexity of living systems can be broken down into describable interactions between specific kinds of parts; their living processes reverse engineered; the parts and their properties freed from their origins in any specific organism, and reassembled, first in thought, then in reality, to produce whatever outcome you can dream up? We see these mechanistic principles in operation in some of the ways that animal models are used in biomedical research, where cells or genes are inserted into the animal which can then be used to test drugs intended for humans, or to model the development of particular pathologies. But perhaps its apotheosis is in synthetic biology: the vision that vital processes can be construed as assemblies of parts specified by their gene sequences, these parts can be fabricated, and connected together to make something completely new – to create the organisms that evolution forgot (Endy, 2005; Baker et al., 2006). You take green fluorescence from here, the ability to live at 200 degrees from there, the ability to digest oil from elsewhere, insert them into your organism of choice, and you have a green, heat-loving oil eater. I have referred to this as a 'flat' ontology of life – any element of a living system can be freed from its origin in a particular organism or organ and mobilised; connected into relays, circuits and networks with other such elements in vitro, or in vivo in other organisms (Rose, 2007).

Some derive a fantasy of biological control from an idea of life as pure mechanism. If we pause on synthetic biology, we can see how misleading this is. As Rob Carlson (2010) recently pointed out, a Boeing 747 consists of about 50,000 kinds of parts – some six million total components – and the precise specification of each part is known and amenable to a quantitative description. A relatively simple cell (for example, yeast) has millions of moving parts, most of which are unknown; approximately 6,300 kinds of genetic parts, of which we can name about half, but for most we have no design specifications at all; not to mention all the other parts that are involved – the structure of sugars and lipids for example – that are not encoded in the genome, and about which we have only the vaguest ideas of how they are shaped and how they work. A human body has something around 10^{14} or one hundred trillion cells – most of which are as complex as yeast – not to mention the microbes that inhabit us. The human brain contains about 100 billion neurons – all of which are different – with 100 trillion synapses connecting them. So one task for social science is to look beyond the hyperbolic forms in which some scientific activities are presented in the current climate, and work closely with the actual researchers to explore their operative philosophy. We will find this more hesitant, more modest – and more open to a genuine conceptual engagement.

Conclusion

Let me move to a conclusion. Must we rush to our philosophers to seek a new way of conceptualising these new relations that I have tried to characterise? Some, I know, find this path attractive. But I must confess, these endeavours are not to my taste. I prefer what Michel Foucault, drawing again on Bachelard, called 'fieldwork in philosophy', and to look not to philosophers of biology, but to the operative philosophy of the biologists themselves, among whom I have spent much time over the last few years. This is not a matter of subscribing to what the scientists themselves say about their activities when they reflect on them from their armchairs, in retirement or in their popular writings. To decipher their operative philosophy, we should ask them, as Bachelard did, to "tell us what you think, not when you quit the laboratory, but during the hours when you leave ordinary life behind you and enter scientific life. Instead of leaving us with your empiricism of the evening, show us your vigorous rationalism of the morning" (quoted in Rheinberger, 2005: 318).

In one of his characteristically enigmatic statements, the French philosopher and historian of biological thought Georges Canguilhem remarked: "The thought of the living must take from the living the idea of the living" (Canguilhem, [1965] 2008: xx). For me, this suggests that at every historical moment, the ways in which we *think about* how to think about vitality must be informed by, underpinned by, shaped by and premised on the very way in which vitality itself is understood in the contemporary sciences of life. That is to say, our relationship to the forms of knowledge generated by the life sciences cannot – should not, in Canguilhem's normative doctrine – be indifferent to that knowledge; cannot treat it as merely one set of claims among others.

Yes, we can identify the conditions of possibility of our regimes of truth about life. Those conditions not only define the structure of the rationality of the life sciences, but increasingly shape our experience of ourselves and our present. They set a path for the development of biomedicine and biotechnology, and all the ways in which vitality today – in plants, animals and humans – has become a domain of intervention and the production of biovalue. In analysing the ways in which the life sciences are reshaping our experience of ourselves in our

present, we can also identify what those truths about ourselves, our lives, our world and our reality make possible or preclude. There is much to be critical of here; for my own part, I suggest that such criticism should be directed to reshaping those pathways in the service of life, and not just of reputation, grants or profit. But all truth claims have conditions, and elegant descriptions of the ways in which our current biological truths have been created do not, in themselves, suffice – or, at least, not for me.

To paraphrase another of Georges Canguilhem's suggestive phrases, we can say that every mode of biological reason is, in a certain way, also a philosophy of life.[17] It is a philosophy of life because our way of living and our sense of how we should live as humans, of why we should live as humans, of what we owe to ourselves and others, of what we can know, what we should do and what we can hope for: all these have become tangled up – maybe always were tangled up – in what we think we are as living creatures. Who can doubt that this is true of all the varieties of reasoning about vitality, intervening in vitality, and questioning vitality, that constitute contemporary biology?

As I have said, there are some who claim that these developments have put the final stake in the heart of vitalism. Do we now inhabit a fully disenchanted world, in which we realise that vitality is merely the intelligible result of physical, chemical, mathematical, stochastical processes? I think things are more complex. Of course, our powers to intervene in our bodies are remarkable: we can replace body parts; modulate vital systems with drugs; tame cancers and much more (Hacking, 2007). As for our brains, we have a very long way to go (Price, 2011). But simple mechanical reductionism does not capture the operative philosophy of the sciences of life and the forms of biomedicine to which they are linked. I do not think that we will come to regard humans, or other living organisms, as mere machines, open to our fantasies of total control. Vitalism will remain as a constant reminder of the self-organising, dynamic, self-regulating complexity of living systems – the fact that, unlike machines, they exist and develop in time and space – and of the inseparability of organism and milieu in life in the real world. The social and human sciences need to grasp these operative philosophies of biology and biomedicine; to explore the 'philosophies of life' which they embody and the potential forms of life to which they may be linked. But more than this, our own disciplines need to grasp the shaping – and the all-too-frequent cramping – of human vitality; to engage with the sciences and play our part in addressing the local, national and global inequities that devastate the vital lives of so many of our fellow biological citizens.

There are good historical reasons why many in the social and human sciences have been highly critical of attempts to build a positive relation with the life sciences. But their dread of determinism, reductionism, and the dire ethical and socio-political consequences of locating humans among the animals, is now misplaced. We must configure a new double relationship with biology. On the one hand, we must recognise the provisonality of the knowledge claims in the life sciences, and subject the tendentious and exaggerated claims of enthusiasts, popularisers and their media representations to critical evaluation. On the other, we must move beyond description, commentary and critique – beyond the study of downstream 'implications' of biology and biomedicine – to develop an affirmative relation to the new ways of understanding the dynamic relations between the vital and its milieu – the vital in its milieu; the vital milieu – that are taking shape. This relationship cannot be one of a wide-eyed embracing of every latest pronouncement, let alone the displacement of our own hard-

[17] Actually Canguilhem wrote "Contemporary biology, read in a certain way, is somehow a philosophy of life". This is the last phrase of 'Le concept et la vie', published in 1966.

won knowledge of the social shaping of human lives. By 'affirmative' I mean a relationship that seeks to identify and work with those arguments which recognise, in whatever small way, the need for a new and non-reductionist biology of human beings and other organisms in their milieu, and which can thus be brought into conversation with the evidence, concepts and forms of analysis developed in the social and human sciences. This requires us to accept that the social and human sciences are also sciences of the living; of living bodies; of living matter; of matter that has been made to live. It is hard to know how such a relationship will turn out. But I regard the project of creating that relationship as one of the most important to confront our disciplines today. It might also restore some of the capacity of my own discipline of sociology to help remake our human world.

You will recall Freud's words about the blows that human narcissism has suffered: first when Copernicus showed that our planet was not at the centre of the universe, but was just a tiny fragment of a vast cosmic system; and then when Darwin showed us humans that we were not the privileged beings of creation and revealed our "ineradicable animal nature". But, Freud goes on, "human megalomania will have suffered its third and most wounding blow from the psychological research of the present time which seeks to prove to the ego that it is not even master in its own house, but must content itself with scanty information of what is going on unconsciously in its mind. We psychoanalysts were not the first…to utter this call…but it seems to be our fate to give it its most forcible expression and to support it with empirical material which affects every individual" (Freud, [1916] 1953–74: vol. XIV, 284–85). Contemporary life sciences, in claiming that the historical, biographical, social and cultural are written into the interior of the individual in their biology and their neurobiology, present a harder challenge to that human narcissism. However, it might be even more important in the ways it reconfigures the relations between humans and animals, humans and matter, and humans and their milieu; in what it helps us understand about our vital existence.

Some will also recall Michel Foucault's words at the end of *The Order of Things* (1970: 386–87). The figure of 'the human' as the unique organising principle of knowledge and morality was, he argued, held together by a certain 'historical *a priori*'. In giving the uniqueness of the human a privileged place as both the subject and the object of 'positive' knowledge, it formed the unspoken premise of the human sciences. Foucault suggested that structuralism would transform this framework, displacing the figure of 'man' from its throne. Almost half a century later, I think that it is not philosophy but the life sciences which are leading an epistemic change in our relationship to the human. And if a new figure of the living is taking shape, effacing the old "like a face drawn in sand at the edge of the sea", what part might the human and social sciences themselves play in the new figure of the human that is being born? That, I think, is the challenge for those who hope to revitalise our own disciplines for the twenty-first century.

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