Bio-Objects

Life in the 21st Century

Edited by

Niki Vermeulen, Sakari Tamminen and Andrew Webster

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The origin of this book lies in York, United Kingdom, in the Science and Technology Studies Unit (SATSU) in the Department of Sociology of the University of York, that was a Marie Curie training site in the period 2002-2005. With the title 'New Genetics/New Society? Integrating Science, Society and Policy', it attracted 15 European doctoral students working on recent developments in bioscience and society. Such was the success of the programme the idea of continuing our collaboration beyond the formal end of the EC contract was welcomed by all: we now have a well-established group that has met for annual meetings (York 2007; Geneva 2008; Uppsala 2009; Graz 2010). In these meetings, we developed our collective work on 'bio-objects' which resulted in this book. In 2010 the network has been granted a COST Action entitled 'Bio-objects and their Boundaries: Governing Matters at the Intersection of Society, Politics, and Science'. This means that our network is expanding and we will be continuing working together in the period 2010-2014 and beyond to further develop the bio-objects concept.

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Introduction
Bio-Objects: Exploring the Boundaries of Life

Andrew Webster

Biotechnologies and new biological artefacts are currently disrupting the conventional boundaries and identities of biological forms – whether these be of a human, animal, plant or synthetic nature. Indeed these discrete forms of life may well be brought together, hybridised, through developments in the biological sciences, such as in tissue engineering. At the same time, these new life-forms – such as pluripotent stem cells outside of bodies, synthetic biology or genetically modified organisms – create new clinical (Mason 2007) and commercial (Waldby 2006) possibilities as well as regulatory demands (Brown and Kraft 2006).

This book conceptualises these different life forms as what we shall call 'bio-objects'. Bio-objects play a crucial role in the 21st century in which increasing knowledge of life and its components are fundamentally transforming what life means and where its boundaries lie: as Thacker (2010) says, ' …it seems that life is everywhere at stake, and yet it is nowhere the same' (ix). New developments in the biosciences – especially the molecularisation of life – and their influence on health care and other aspects of our society have been explored in a diverse body of literature, discussing the ethical (e.g. Holm 2005), legal (Johnston and Kaye 2004) and social (Rose 2006) implications of these new developments. In the following chapters we will draw on an extensive body of work to ground our own material which is primarily though not exclusively underpinned by and seeks to make a contribution to science and technology studies (STS). In this introductory chapter, we sketch out some of the basic ideas we will expand on in later chapters about the meaning of the bio-object, give some indication of how this work relates to existing literature and outline the structure of the book as a whole.

The meaning of bio-objects and bio-objectification

We want to suggest that the term 'bio-object' is a useful conceptual device or heuristic to refer to socio-technical phenomena where we see a new mixture of relations to life or to which 'life' is attributed. As a consequence of these novel relations, the boundaries between human and animal, organic and nonorganic, living and the suspension of living (and the meaning of death itself), are questioned

and destabilised, though sometimes can be re-established or re-confirmed. This dynamic process, and the possibility of moving backwards and forwards between different life statuses suggests that there is no once-and-for-all list of bio-objects, a sort of bio-object catalogue, made up of life forms that have specific properties or essential characteristics. Instead, we want to argue – and show in this book – that it is more useful to focus on the *process* of bio-objectification, that is to say, how different life forms are created and are given life, and perhaps, multiple lives. Aborted fetal tissue is a simple example of this process that is deemed, as such, to be waste matter and dead, yet can be re-vitalised as source material for stem cell lines. Here, as elsewhere, life is in constant interplay with novel techniques aiming at re-routing, diversifying, collecting and commodifying the vital processes that 'life' consists of.

A number of deep going philosophical questions are raised by the emergence of technologically enacted vital materiality – for example cell life imitated by silicon chips or deep frozen animal reproductive material – as they contest our contemporary understanding of 'life' and its boundaries. What could be said about organic life does not apply easily to forms of life that are technoscientifically created and sustained – that might be regarded as 'creatures' '…positioned somewhere between the normal and pathological' (Thacker 2010: 97). At the same time these novel forms of vitality also highlight the materiality of vitality in surprising ways. Bio-objectification clearly requires working with the materiality of the biological but not all biological objects – say the gene – can be seen as bio-objects, even though they may become the basis for them.

To be more precise, particular instances or collections of matter *become vital* in/to different practices and knowledge regimes, which at the same token *make life matter*. Historically speaking, the knowledge regime of biology, hence also 'biological objects', are of recent invention as Foucault (1970) and other historians of life sciences have famously argued. What we are currently witnessing, however, is that 'life' as an *object* of research, intervention and innovation is increasingly represented through an idiom of science and its unquestionable regime of truth – both in academic literature as well as in science communication aimed at different publics. A number of academic contemporary writers (e.g. Rose 2006) even claim that humanity has crossed a threshold where life has become totally manageable through its 'molecularisation/genetisation' as a result of a revolutionary co-development of scientific understanding of life's basic components and the technologies capable of representing and modifying them (e.g. molecular structure and genetic engineering). In short, the argument is that the total 'objectification' of life has happened through breakthroughs in scientific knowledge and related representation and intervention techniques.

While the 'molecularisation/genetisation thesis' certainly holds true for certain epistemic cultures (Knorr-Cetina 1999) of our technoscientific modernity (such as bio-medical research communities), the relevant collection of things related of life -processes, materialities and social/political issues – are not so clearly cut in other communities or for all actors involved. In fact, the argument of molecularisation

of life dangerously flirts with the essentialisation of life as molecules and DNA, the reduction of the meaning of living and materialities of life to an essentially contemporary biological thinking. What we argue in this collection of articles is that in order to resist the temptation of this reductionist thesis we have to look in detail to the way in which life is *made an object* in different settings – both in and outside of the current truth regime of the contemporary biosciences. Instead, life – and different forms of life that are created – become an object of knowing, representing and intervening in a myriad of ways not reducible to the molecurisation thesis. Rather than reduction, we see hybridisation everywhere, the ongoing 'border crossings' (Haraway 1997: 60) made possible by the biosciences and by the socio-technical cultures that enable their movement.

Given this state of affairs, we expect to see bio-objects as being characterised as having considerable fluidity and mobility across different socio-technical domains or arenas. This means that a bio-object, associated with, say, biomedical research, may find its way into the food system or the environment, become part of a repository and new medium of technical innovation (as in biobanks or cord blood banks), and have multiple or even contrasting cultural meanings as it circulates between different sectors or networks of society. At the same time, new regulatory boundaries are developed for what human and non-human material can and cannot be legitimately traded as bio-objects (for example, oocytes and embryos) (Hauskeller, Bender and Manzei 2005).

Much of the recent literature in STS that has examined the issues central to this collection has focused on the field of biomedicine and particular areas within it, such as genetics/genomics (Atkinson et al. 2009), the tissue economy (Waldby and Mitchell 2006; Sunder Rajan 2006) and through its commercialisation, the exploitation of reproductive and clinical labour (Cooper 2008). The biomedical domain is clearly one where matters of life and what matters, and definitions of normal and abnormal life, provide a rich ground for STS scholars to explore the life-technology relationship. Such work shows that what is deemed to be medically normal is highly dependent on what technologies exist and how these – through greater diagnostic power for example – define the boundaries of the normal and the pathological (Canguilhem 1998; Lock and Nguyen 2010); Rose (2007) calls these – echoing Foucault – 'technologies of optimisation'. The book builds on this corpus as well as recent work on biological citizenship (Rose 2006), the contestation over categories of the biological (witnessed e.g. in the emergence of 'biomedia' as Thacker, 2005, argues, [see also Bauer and Wahlberg, 2009]) and the precariousness of new life (see, e.g. Mesman 2008, and her study of premature birth).

Beyond the biomedical domain, work by STS scholars on the role of the taxonomic sciences (e.g. Waterton et al. 2010) shows how taxonomy itself as the classification and so in effect disciplining of life (and indeed, of scientific communities) changes over time as new techniques are developed, such as genetic determination of species boundaries. More importantly for our purposes, this work also makes clear how taxonomies are best seen as epistemic assemblages, that is, always relational and subject to change as to what 'counts' as 'in' and 'out'. Related

work on standardisation (e.g. Bowker and Star 2000; Eriksson and Webster, 2009) shows how classification procedures not only seek to order and bring closure to – 'sort out' – life forms (such as 'race') and behaviour (such as the allocation of illness categories) but also carry moral dimensions and presumed hierarchies of life. Bio-objects can be closed down or opened up as they fall within or move across classificatory regimes – such as in insurance systems (e.g. Van Hoyweghen, this book) or international databases to do with crime, biodata, identity, or indeed at a mundane level, as to what goes into what recycling box (Neyland and Woolgar, 2010). More generally, they can be directly linked to the reorganisation of scientific disciplines themselves, as Vermeulen shows (Chapter 11, this book).

Classification is, in one sense, a form of governance inasmuch as it provides one of the bases on which the regulation of life can occur, establishing boundaries of responsibility, inclusion and exclusion, and accountability. Governance forms an important theme in the book to encompass both formal state regulation and the 'soft law' that monitors and steers bioscience according to culturally derived normativities (Gottweis et al. 2008). More recently, Faulkner's (2009) work on 'governation' provides a conceptual framework that links governance with innovation, and shows how the two are co-constructed (Brown and Michael 2004).

The governance and materiality of bio-objects: Making matters of vital concern

In this collection we see governance as having two inter-related processes: governance of the bio-object, precisely through governance being generative of the bio-object qua *object* (as Metzler shows Chapter 10, this book), and thereby governance through the bio-object. So governance and the other core theme of the book – materiality – come together, for governance also points to the social requirements associated with the traceability of bio-objects and their moral status within different domains. The play of governance/materiality relations can vary considerably, such as enabling hybridity or closing it down. For example, as Brown argues later in this book (Chapter 5), UK legislation on interspecies embryos has successfully enshrined 'the novel unpredictability of hybrid biology in legal statute.' In contrast, during the Bush administration in the US, university researchers were barred from storing human embryonic stem cells from unapproved lines in lab refrigeration units paid for with NIH (National Institutes of Health) grant money and had to have designated 'private' and 'federally-funded' fridges for different cell lines. The two sets of lines as material objects carried quite different moral statuses, which were then reflected in two discrete fridges, which, as a result, were themselves of distinct material and moral status.

Paralleling the question of the material and moral traceability of bio-objects is the question of the tradability that they have. Indeed these two are typically closely tied together: for example, a novel biomedical therapy or device becomes marketable, tradable, only when it has secured a licence to be marketed through

approval by regulatory agencies, such as the European Medicine Agency, and meets the requirements set down in various 'directives', such as the Advanced Therapy and Medicinal Product Directive (ATMP). The ATMP gives authorisation for a product to be placed on the market.

Outside of the commercial market for therapies or products, bio-objects – such as transgenic mice – become tradable across labs where they are deemed to conform to the standards of a high quality 'pure' transgenic mouse, but simultaneously framed as ordinary lab mice, as one of the chapters (Holmberg and Ideland) in the book explores. Tradability and traceability are in turn linked, for bio-objects move across and are commodified within different trading zones that are more, or less, open. Genetically-modified crops, for example, may (as in the US) or may not (as in the UK) be grown commercially, are subject to regulatory and trading constraints and various forms of containment, including biocontainment strategies which uses the genetic internalisation of regulation to overcome the failings of governance regimes in managing the problem of policing. In one sense, plants become self-policing. A further issue is where to draw the boundary lines between what is, and is not, subject to regulatory control: in the European Union, while food from cloned animals cannot be sold without authorisation as they fall under the terms of the 'novel food directive', there is some uncertainty as to whether their offspring are too (Mahony 2010).

These different themes – of the attribution and malleability of life, its materiality, governance and movement across different trading and regulatory spaces – are key to our understanding of the bio-object and the conceptual model we have of the bio-objectification process, and figure in different ways in the chapters that make up this book. They all share too a particular methodological approach that draws on a number of STS strategies, and these are sketched out below.

Methodological approach

As we are concerned in this book to understand how bio-objects come to be and the lives that they take-on we are interested, as noted above, in bio-objectification as a process. This means that the methodological approach – the logic of our inquiry – is to understand the interplay of material and epistemic dynamics in each of our cases, and to look at the ways in which boundaries of life are disrupted or conserved, are disentangled from, or entangled with, other forms of life.

We regard bio-objectification as an emergent process inasmuch as it is shot through with uncertainty and unknowns (Webster and Eriksson 2009). We also recognise (as Pickering) that materiality has agency, or performativity, inasmuch as the object – as we saw above with GM crops – can act at a distance in ordering social (farming) practices. This performativity is, as Pickering says, a 'dance of agency', but one we would characterise as reflecting an unstable ontology, an ongoing process rather than a stable form of being – so, our chapter on transgenic mice describes them in this regard as 'boundary crawlers'. As such, bio-objects