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Writing biology with mutant mice: The monstrous potential of post genomic life

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ABSTRACT

Social scientific accounts identified in the biological grammars of early genomics a monstrous reductionism, 'an example of brute life, the minimalist essence of things' (Rabinow, 1996, p. 89). Concern about this reductionism focused particularly on its links to modernist notions of control; the possibility of calculating, predicting and intervening in the biological futures of individuals and populations. Yet the trajectories of the post genomic sciences have not unfolded in this way, challenging scientists involved in the production and integration of complex biological data and the interpretative strategies of social scientists honed in critiquing this reductionism. The post genomic sciences are now proliferating points from which to understand relations in biology, between genes and environments, as well as between species and spaces, opening up future possibilities and different ways of thinking about life. This paper explores the emerging topologies and temporalities of one form of post genomic research, drawing upon ethnographic research on international efforts in functional genomics, which are using mutant mice to understand mammalian gene function. Using vocabularies on the monstrous from Derrida and Haraway, I suggest an alternative conceptualisation of monstrosity within biology, in which the ascendancy of mice in functional genomics acts as a constant supplement to the reductionist grammars of genomics. Rather than searching for the minimalist essence of things, this form of functional genomics has become an exercise in the production and organisation of biological surplus and excess, which is experimental, corporeal and affective. The uncertain functioning of monsters in this contexts acts as a generative catalyst for scientists and social scientists, proliferating perspectives from which to listen to and engage with the mutating landscapes, forms of life, and languages of a post genomic biology.

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'We need a critical hermeneutics of genetics as a constitutive part of scientific practices more urgently than we need better map resolution for genetic markers' (Haraway, 1997, p. 160).

There are now people working with genetically modified mice, who really are not animal researchers. The joke is they don't know which end bites' (Laboratory Animal Vet, interview 2009).

1. On the margins

Monsters are biotextual beings (Botting, 2003). They are of biology and text, material and semiotic, things and words, 'flesh and writing at the same time' (Milburn, 2003, p. 606). We most readily recognize them in their corporeal form; in the bodily destabilization of expected physiology or hybridization of separate species. This transformation of one kind of being to another is a monstrous event. Its arrival marks both the pathological and the normal body, for we only apprehend this addition to the normal through comparison with the illustrative texts of taxonomy, diagnostics or law (Canguilhem and Jaeger, 1962; Foucault, 2003). These texts produce the monster as much as the mutations, transpositions, substitutions and perversions that enable bodies to exceed their prior categorization. Monsters also reproduce in these textual circulations. The meanings of Frankenstein's monster proliferate, originating a genre of horror and re-articulating disgust and dread in considerations of contemporary biotechnology (Turney, 1998). Yet, Frankenstein is also a story about responsibility and care. The meanings of the monstrous are not fixed. Back in biology, there are hopeful monsters too (Chouard, 2010). The monstrous birth can be a speciation event, a herald of new species to come (Milburn, 2003). These forms are initially unnameable, but come to take their place within the constant variation of the world. As Derrida remarks, 'the notion of the monster is rather difficult to deal with, to get a hold on, to stabilize' (Derrida, 1995, p. 385).

There is geography here as well as monsters take their place in complex ways. They are most commonly imagined as 'denizens of

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the borderland' (Milburn, 2003, p. 603), arriving from the boundaries of conventional knowledge, representing, at least initially, the limit to the order of things. If in the 16th and 17th centuries they inhabited the unmapped spaces beyond the known world (Daston and Park, 1998); and in the 18th and 19th they arose from the in-between states of natural history classifications (Ritvo, 1998); in the 20th and 21 centuries, they seem to demonstrate a more explicitly political identity, fracturing the humanist assumptions of Enlightenment thought (Neocleous, 2005). Monsters increasingly appear in social theory too, not least within the 'French plague' of deconstruction (Freeman, 1987, p. 21), as Derrida returns repeatedly to the figure of the monster as a means of thinking otherwise. The monster is a deconstructive icon for exploring 'what may count as nature' (Haraway, 1992, p. 63), challenging totalizing conceptions of both nature and culture in contemporary biology. Monsters have valued theoretical affects; 'one must produce what in fact looks like a discursive monster so that the analysis will be a *practical* effect, so that people will be forced to become aware of the history of normality' (Derrida, 1995, p. 386). Yet, this aesthetic embrace of the monstrous raises questions about their enduring critical impact. The more we think we know where to find these strange material-semiotic actors, and what they embody, the more their transgressive qualities recede. The rapid reproduction of potentially monstrous bodies within artistic practices on the boundaries between art and biology, suggests that much contemporary bioart, in telling us what the monstrous looks like and placing it on the margins of mainstream biology may, despite probing critical commentary (Dixon, 2008), help keep it there. Derrida reminds us of these duplicitous qualities: 'as soon as one perceives a monster in a monster, one begins to domesticate it' (Derrida, 1995, p. 386).

This is a paper about encountering the monstrous in unexpected places and in unexpected forms, and the ethical necessity of both openness and hesitation as researchers seek to rewrite understandings of genetics through the production of mutant mice. It was prompted by the invitation to contribute to this special issue. I have written elsewhere about the potential for a geography of monsters (Davies, 2003), but this time I hesitated. It felt it might be a distraction; too much on the margins of current research tracing the circulation and regulation of genetically altered mice within contemporary functional genomics. The questions here are explicitly spatial: the co-ordination of large-scale mutant mouse resources, the translation of research from experimental sites to clinical practices, and the negotiation of multiple disciplinary and territorial boundaries; but, they are not immediately monstrous. The aesthetics in this sphere of biology are more perceptibly clinical than grotesque. The language of monstrosity would be plausibly resisted by my respondents, with their careful negotiation of animal welfare, ethical experimentation and medical expectation. Yet, there is something uncanny about this renewed grappling with animal forms within contexts marked out by the sequencing languages and coding practices of genomics. Perhaps monsters do not have to look monstrous to have disruptive or generative effects. This prompted a further hesitation, and so I agreed. The mundane laboratory mouse can perhaps be monstrous, if you do not know which end might bite.

The monstrous in this paper is thus a descriptive and interpretative concept. It draws attention to the gaps in sense-making, and the grasping towards new ways of understanding, as molecular biologists trained in the vocabularies of mathematics seek to understand gene function through the excessive corporeality of laboratory mice. The account makes use of the art, architecture, language, experimental apparatus and embodied animal forms encountered in ethnographic exchanges with these individuals and institutions.[1] These resources offer insight into the potential for meanings and materials to translate across lacunae, but they also indicate transgressions. The narrative that follows is thus not linear, but looping, returning repeatedly to the points of hesitation, as meanings fail to articulate and new possibilities and aporias emerge. From the work of Derrida, it takes the monster as a recurrent supplement, or outgrowth, of the biotextual forms and spatial logics used to understand early genomics, as work with these strange animal bodies alter its histories and its futures. From Haraway, this promise of monsters emerges from a 'mapping exercise', a travelogue around mindscapes and landscapes, which connect the material and semiotic, and resist an easy return to ethical calculation (Haraway, 1992, 2008). Both also refuse a singular definition of the monstrous, indeed to do so would defeat the point: 'a monstrosity never presents itself' (Derrida, 1990, p. 79). The article thus performs its own monstrosity, for these translations and transgressions are not settled; incoherence is part of the story. It narrates these breaches through the moments of hesitation, the pause within the ethnographic moment, the realizations that mice can bite. It asks you to read slowly, and consider how we open ourselves, through science, art, ethics, language and social scientific interpretation to an encounter with the unknown, the strange and the multiply monstrous potentialities of post genomic life.

2. Of mice and monsters

Understanding this incipient monstrosity requires further reflection on the changing nature of what is ruled out of bounds, what is felt to be monstrous, in contemporary biological practice. What was monstrous in 16th or even 19th century biology no longer holds the same repugnant fascination or destabilizing power. In the particular conjuncture of post genomics, as biologists seek to make biological sense of the abundance of molecular information generated by sequencing efforts, the relations between biology as text and biology as the thing itself are shifting again (Franklin, 2006). At its peak, the language of molecular biology was a reductionist one; a forcing of flesh into digital format. Yet even before the mapping of coding operations proclaimed as foundational to life were completed, a proliferation of alternative approaches for understanding biological relations were emerging, post genome, around proteomics, systems biology, epigenetics, gene–environment interactions, and so forth. As Sarah Franklin puts it, 'the silence of the genome has given way to the cacophony of the epigenetic' (2006, p. 169). This is not merely a shift in biological grammars, but of biological practices too. A generation of molecular biologists, whose educational trajectory was oriented to expect the future of biological enquiry to be completed *in vitro* and *in silico*, are returning in large numbers to study life *in vivo*. After a period scattered at the margins, the mouse is returning to the large-scale centres of contemporary biology as model organisms in functional genomics, as one part of these post genomic endeavours (see for example, Abbott, 2004; Rosenthal and Brown, 2007; Gondo, 2008). Everything put aside to focus on the coding operations of

[1] This paper draws on research completed as part of a set of projects around 'Biogeography and Transgenic Life', funded by an ESRC research fellowship, Grant No. RES-063-27-0093. It is based on ethnographic research and in-depth interviews exploring the use of mouse models in international functional genomics carried out in Europe and the USA in 2009. The use of mice as models is only one of many approaches to understanding gene function in what is sometimes characterised as the post genomic sciences. Systems biology, epigenetics, proteomics, and other model organism research would all be additional examples. The questions raised by the use of mice are slightly different, given the regulation of mammalian research and the broader cultural context to animal experimentation. The research involved around 90 interviews with a diversity of research scientists, laboratory veterinarians, animal welfare scientists, funders and regulators, as well as participation in research meetings and international conferences. All research participants were offered anonymity.

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