Volume 2, Number 2 - Spring 2011

Kay Peggs

Risk, Human Health, and the Oppression of Nonhuman Animals: The Development of Transgenic Nonhuman Animals for Human Use

Introduction. In May 2009, the journal *Nature* published an article by Erika Sasaki et al. outlining a research development in biomedical science that, the authors argue, will provide new possibilities for using nonhuman primates in experiments for human health benefits. The authors claim that their research offers the potential for the reproduction of transgenic marmosets who, because of their "close genetic relations with humans" (523), might be extremely useful in advances designed to reduce the risks from a range of human health hazards. By conducting a critical analysis of the article, I will explore moral questions connected with experiments on nonhuman animals, in order to reflect upon assumptions central to claims about the progress that such nonhuman animal experiments are said to represent. My discussion is rooted in sociological theorizing about risk because, as Sasaki and her colleagues' work demonstrates, biogenetics is being used to amplify risks to nonhuman animal health for the purpose of reducing risks to human health. Sociological theory allows us to examine assumptions about distinctions between humans and nonhuman animals, and among nonhuman animals, that intensify the commodification of nonhuman animals. Critical discourse analysis allows us to unveil assumptions made by Sasaki et al. that serve a logic of scientific advancement driven by human preoccupation with human benefits at the expense of nonhuman animals, which, I conclude, conflicts with human moral progress.

My aims are reflected in the structure of the paper. The opening section explores risk and human health with a focus on the ways in which humans have sought, via biomedical research, to reduce human risks from health hazards. This is followed by consideration of how experiments using nonhuman animals have been utilized in the quest to diminish human health risks. This leads me to Sasaki et al.'s (2009) article. By using a critical discourse analytical approach, I reflect upon notions of "progress" as rooted in the aspiration to transfer to nonhuman animals a range of health hazards that we seek to eliminate in the human. I conclude that interfering with the genetics of nonhuman animals with the aim of engendering in them a predisposition to develop health hazards that we want to eliminate in humans represents human degeneration rather than progress.

Human hazards, biomedical science and human health. Owing to the way in which it pervades our lives, Piet Strydom brands risk the "signature of contemporary society" (4). Risk is such an important aspect of our lives, according to Ulrich Beck, that it, rather than wealth, is the main principle around which inequalities are organized(*Risk Society* 19). Risks are much publicized (Tulloch and Lupton 1) and in the current phase of modernity are most commonly associated with negative outcomes. Consequently,

> the utopia of risk society remains peculiarly *negative* and *defensive*. Basically, one is no longer concerned with obtaining something "good" but rather with *preventing* the worst… (Beck 49; emphasis in original)

In our desire to prevent the worst, Zygmunt Bauman observes, we are preoccupied with calculating the probability that the worst will strike, and consequently we live our lives in constant anxiety (*Liquid Fear* 11). The current phase of modernity "is a contraption attempting to make life with fear liveable" (6); our anxious lives are made more bearable if we can predict and control a range of hazards, including those associated with human health. But the hypervisibility of health risks compels us to contemplate the health hazards that we fear are lying in wait for us.

We feel menaced by a range of (potential) health problems, even though our overall health has generally improved (Busfield 299), and we are, by and large, freer from serious diseases than we were in the past (Giddens, *Modernity* 115). Despite these improvements, human movement across the globe has led to a resurgence of older infectious diseases (such as tuberculosis) and the development of newer ones (such as HIV/AIDS) (Turner, "Social Fluids" 8). In addition, the spread of new strains of contagious diseases (such as pandemic influenza) has resulted in additional worries about the development of conditions that might be resistant to known treatments. Furthermore, genetic research has caused anxiety about individuals' probabilities of developing specific genetic conditions (Le Breton 4). Consequently, in terms of health, contemplating hazards and assessing risk are ubiquitous exercises. But human health is viewed as an accomplishment grounded in the wider remit of reflexive risk-monitoring (Giddens 123). For Anthony Giddens, "reflexivity" involves the continual weighing of different positions in the light of new information, which enables us to develop strategies for avoiding putting ourselves at risk (20). Thus, with respect to health, we are expected to assume responsibility for our (healthy) futures (Smart 89); health is viewed as an individual accomplishment (Clarke et al. 162). However, increased individual risk consciousness is associated with mounting dependence on expert systems (Beck, *Risk Society* 4), and our project of health, of course, relies on scientific research aimed at minimizing human health hazards.

Responsibility for human health is constructed at the levels of the individual (e.g. in terms of a commitment to healthy behaviors) and the collective. At the collective level we expect, for example, biomedical research institutes and pharmaceutical companies to discover techniques for reducing human health risks. Although such research can provoke further anxiety, as expert advice can be contradictory and because human intervention can generate conditions that are resistant to treatment (e.g., see Bowcott 2) or can produce additional health hazards (e.g., see Turner, "Culture, technologies, and bodies" 35), biomedical science is usually commended for human health advances. Human health is a collective achievement based in wider societal responsibility for (biomedical and other) developments designed to counter the possible ravages associated with human bodily vulnerability, human biology, human diseases, and human ageing. In this way, technological and scientific research points the way to a possible utopian future based on the human ability to prevail over our bodily limitations (Turner, "Culture" 19). This possible utopian future is grounded, however, in the past, present, and future commodification of millions of nonhuman animals. In terms of the past and present, the UK-based Research Defence Society[1] pays tribute to human medical advances that they commend as being founded in experiments using nonhuman animals (2), and Sasaki et al. claim future potential for the use of nonhuman animals in experiments designed to achieve human health gains. These claims are contentious, not least because other scientists have pointed to the problems associated with the prediction of human health outcomes using nonhuman animal experiments (e.g., Knight 96). Nevertheless, biomedical science that uses nonhuman animal experiments is often eulogized.

Faith in science and technology to enable the calculation, control, restraint, or circumvention of human health hazards affords some comfort in our anxious lives. Consequently, ours is an "age that is *guided* by science, an age that, in some way, chooses its ideals as well as its medicines and its breakfast foods on grounds provided by scientific research" (Midgley 15; emphasis in original). Although scientific breakth breakthroughs have not facilitated unfettered control over our (health) futures, the calculation of the probability of a hazard occurring is "the next best thing to (alas unattainable) certainty" (Bauman, *Liquid Fear* 10). This dependence on scientific breakthroughs points to Beck's paradox (*Risk Society* 2), where risk society has been produced by sophisticated, devastating, and potentially catastrophic scientific and technological developments, while at the same time scientific and technical developments also provide methods for risk reduction. This is evident in the area of human health. We anticipate a better and healthier life based in scientific and technological developments, but we also worry that scientific and technological endeavor will generate a feared disastrous future (4). For example, "genetic screening" is said to increase the potential for calculating individual predispositions to a growing range of genetic disorders, yet genetic screening might also generate "new forms of biological discrimination" (Le Breton 10-12). This could have devastating consequences for humans at risk of exclusion based in their genotypes (13) and, in an attempt to control feared genotypes, there is increased focus on genetic research. Such research is leading to increased dependence on nonhuman animal experiments (Brown and Michael 3).

Individualization, biomedical science, and human values. Although science has a paradoxical place in risk societies, not least because scientists often make contradictory claims (Giddens, "Risk and Responsibility" 6), it seems nonetheless undeniable that science, as Mary Midgley suggests, is regarded as the singular form of rational thinking (14). The driving force of biomedical science is the desire to alleviate human health hazards, and it is the attachment to rational thinking associated with science and with human benefit goals that allows nonhuman animal experiments to be undertaken at all (Emel and Wolch 20; Peggs, "Nonhuman Animal Experiments" 16). In such experiments, nonhuman animals are exposed to risks that would be considered unacceptable for humans (Henry and Pulcino 306). Of course, it is wholly reasonable that humans should try to reduce, and optimally to eliminate, the health risks that plague our lives, but this focus on our own needs limits our moral range to one that is increasingly individualized. Individualization consists in the focus on "me" and "my" yearnings (Beck and Beck-Gernsheim 95), and "my" incessant wants and needs include "my" wish to diminish or eradicate risks to "my" health. For Bauman, this "me" society is characterized by a narrow moral scope in which individuals spend most of their lives pondering which goals to pursue rather than thinking about the means of achieving them (*Liquid Modernity* 2). And because we live our lives in states of perpetual anxiety, we spotlight our goals and focus on our own costs and benefits rather than on costs and benefits to others. If we scale up the individual "me" to include the human "us," it is evident that in our focus on "our" health anxieties we imagine scientific progress in terms of health benefits for "us" at the expense of "the other," the nonhuman animals.[2]

Annually, over 100 million nonhuman animals are used in experiments worldwide (Rowlands 124). Although nonhuman animals have been used in experiments from living nonhuman animal dissections in ancient Greece (see Zola et al. 40) to the genetic modification of marmosets, there have been significant changes over time. For example, at present some nations declare that experiments on nonhuman animals must adhere to ethical codes (e.g. see Commission of the European Communities 60-61), whereas, as Mark Rowlands observes, if you were a nonhuman animal used in a seventeenth or eighteenth century Cartesian scientific experiment, "you could expect to find yourself nailed to a vivisection board being slowly cut open. You would be conscious throughout"(3). But even given current ethical codes, Rowlands warns, "our present day treatment of many animals is no better than that of the Cartesian scientists …. in some respects we are much worse… At least they thought that animals were incapable of suffering" (5).

Historically, nonhuman animal experimentation has been used to provide the experimental method with an identity established in "science" rather than in the arts (Rupke 7). The scientific enterprise lays claim to the generation of value-free "facts" obtained by the scientist, who is depicted as a "disinterested human observer" (Adams 138). Zuleyma Tang Halpin notes that accordingly "scientific objectivity necessitates the rejection of feelings in favor of intellect" and "the separation of the scientist as the thinking 'self' from the object of study, 'the other"' (285). Nevertheless, as Midgley observes, "scientific objectivity" is actually grounded in "a new scale of values, a new priority system, leading to particular political projects" (15). For example, norms and values associated with the intrinsic importance of (biomedical) scientific research are deeply entrenched in Western societies (Gray xiii-xiv), and within biomedical research (Sasaki et al.'s research is evidence of this) human values ensure that it is the human who is prioritized. As Jane Welchman observes, within the biomedical community "it is widely held that partiality to human interests is not only defensible, but obligatory" (245). The view that partiality to human interests should be fundamental to biomedical research undoubtedly extends beyond the biomedical community to the wider public (e.g., see Henry and Pulcino 306). Nevertheless, experiments using nonhuman animals are increasingly controversial (e.g, see Henry and Pulcino 305). Researchers who use nonhuman animals in experiments usually have to engage in the moral debate about such experiments (Michael and Birke 189). This engagement is confirmed by statements made by, for example, the UK-based Research Defence Society, which asserts that "…animal research has played a major part in developing improvements in human health," but "[t]he work we do is performed with compassion, care, humanity and humility" (RDS 2). So, although the persistence of nonhuman animal experiments is deemed justifiable by constricted values that focus on ways of alleviating human suffering and illness (for discussion, see Brown and Michael 5), a broader vision extends beyond instrumental human costs and benefits to harms to nonhuman animals as well (e.g., see Peggs, "Nonhuman" 18). With this in mind I now turn my attention to an analysis of extracts from Sasaki et al.'s article in order to consider notions of progress as associated with nonhuman experiments designed to diminish risks to human health.

The "Promise" of Genetics: Transgenic Marmosets and the Control of Human Health Hazards. Sasaki et al. claim that their results build on previous work that uses genetically modified nonhuman animals for biomedical research. The innovations Sasaki et al. claim are two-fold. First, while previous developments in the construction of transgenic nonhuman animals have centered on mammals such as mice, the nonhuman animals used by Sasaki et al. are marmosets who, as primates, are seen as particularly beneficial in biomedical research because of their "close genetic relations with humans" (523). Second, the transgene used (in the form of a green fluorescent protein) was passed from parents to young, thus suggesting the potential for transgenic marmosets to pass on, for example, a human cancer gene, via natural reproduction (526). This is viewed as particularly beneficial, as it points the way to the establishment of colonies of nonhuman animals who could be born with human disease potential, ready at hand for biomedical experiments. The authors claim that their research results are consequently extremely important in research that seeks to advance human health (523).

In their experimental use, nonhuman animals are "transformed from holistic 'naturalistic' creatures into 'analytic' objects of technical investigation" (Lynch 266). Thus, "the naturalistic animal provides the conditions for achieving the analytical counterpart" (280), and is transformed from nonhuman animal into paper (Latour and Woolgar 50). Genetic research is a further element of this transformative process, as transgenic nonhuman animals carry a gene that is foreign to them, which amplifies their use "as models for many human diseases" (Hessman Saey 13). The development of transgenic marmosets follows the development of other transgenic nonhuman animals (Schatten and Mitalipov 515). The mouse "patented" as OncoMouse is an example, where "foreign DNA is inserted into the mouse genome" (ibid.), resulting in a transgenic mouse who "contains the Myconcogene, and so has a predisposition to develop cancer" (Patent Watch 1). Sasaki et al.'s research is viewed as a progressive step in transgenic technology because, according to Richard Ingham (1), "medical researchers have hankered for an animal model that is closer to the human anatomy than rodents," as "disorders such as Alzheimer's and Parkinson's disease are too complex to be reproduced in transgenic mice and rats who are 'the mainstay of pre-clinical lab work.'" (1). The possibility for biomedical experiments using transgenic marmosets represents, for these writers, progress towards the goal of reducing the risks associated with many feared human diseases.

Risk to human health is a ubiquitous topic, both in public discourses (recently seen in news media reports about pandemic influenza; see Campbell 4) and in scientific discourses (seen in academic papers on the topic health and medicine, see Wilkinson 93). Because genetic information can be used as a starting point for the hypothetical projection of future health, David Le Breton declares, "everybody, even if they are in good health, is potentially sick without knowing it, by virtue of having a greater risk than others of developing a particular condition" (11). So the health destiny of individuals is located in their biology, and "genetic determinism," as Anne Kerr and Sarah Cunningham-Burley argue, "revitalises the modernist imperative to control human nature as never before" (289). Predictive medicine associated with biomedical genetic research enables those with potential genetic conditions to be risk-assessed, and this assessment may be accompanied by ill-health control. Thus nonhuman animal experiments that spotlight the prioritized value of human health are presented as progressive, and biomedical research that leads to such developments can receive high scientific acclaim. For example, Robert Winston, a UK-based medical researcher, proudly announces that "Animal research contributed to 70% of the Nobel prizes for physiology or medicine" (RDS 2). The plea for scientific acclaim is evident in Sasaki et al's paper for, in terms of scientific innovation, they declare that

> To our knowledge, this is the first report of transgenic non-human primates showing not only the transgene expression is somatic tissues, but also germline transmission of the transgene with the full, normal development of the embryo. (525-6)

As Ingham (2) explains, the first transgenic monkey, born in 2000, could not pass on the "foreign gene" to reproductive cells (that is, sperm or egg), whereas Sasaki et al. claim that the transgenic marmosets can reproduce "naturally." Of course, science seeks to "legitimate itself" (Michael 315), not least via discourses that function to present the "potential" as "actual," and we get a flavor of this in the extract above. In using scientific discourses that are intended for the readers of the scientific journal *Nature,* Sasaki et al. are eager to persuade other scientists and "relevant social actors" that their "manufactured knowledge is a route to a desired form of very objective power" (Haraway, *Simians* 185), not least the potential to control human ill-health. Stem-cell researchers Gerald Schatten and Shoukhrat Mitalipov seem convinced, as they describe the birth of transgenic marmosets as "undoubtedly a milestone" (515). Of course, Sasaki et al.'s "milestone" is a claim regarding the *potential for* rather than *actual* research into human disease; but this need not detain us here, as our concern is not the reliability of Sasaki et al.'s work, but rather the moral underpinnings of their research. Sasaki et al.'s research is grounded in notions of progress, i.e., progress based specifically in scientific discovery. In order to explore the discourses used by Sasaki and her colleagues in their article, and to reflect critically upon the notion of progress in their research, I will apply critical discourse analysis to "analyse how social and political inequalities are manifest in and reproduced through discourse" (Wooffitt 137). I will explore constructions of, and assumptions about, "progress" as it is associated with scientific "innovations" in the reduction of human health hazards, which serve to justify the continued, and indeed augmented, oppression of nonhuman animals.

"Promissory Technology": Erika Sasaki et al.'s Experiments Using Transgenic Marmosets. Science is seen as the instrument with which humans can control the human body and control the hazards that impair it (Haraway, *Simians* 43). In this way, "hazards exacerbate the dependence of everyday life on science" (Beck, *Risk Society* 161), and genetic biomedical research has become an important aspect of the human health project (Newton 106-7). Scientists argue that genes predispose certain individuals to particular conditions (Kerr and Cunningham-Burley 289), and promissory medical science relies on gene research as a tool for influencing human health destiny. Although Tim Newton (110) observes that a direct association between genetics and health seems to apply to few human diseases, and the association between genes and human health overlooks the "multifactorial" nature of human health, he notes that gene research nonetheless proclaims a utopian future. Such research is not only used to control human genetics, it is also being used to manipulate the genetics of nonhuman animals in the cause of human health. Thus, Sasaki et al. claim that,

> [i]n particular, genetically modified primates would be a powerful human disease model for preclinical assessment of the safety and efficacy of stem-cell or gene therapy. (523)

The "sense of fatalism about genetic disease [that] ... internalises older notions of destiny" (Kerr and Cunningham Burley 284) is countered by genetic research that "conjures up worlds where disease will be precisely targeted, human ageing retarded, and biology re-written" (Newton 100). The imperfect "human biology [that is] ... in need of interventions, enhancements and improvements" (Metzler 422) has found promise in genetic research. This "genomic futurism," in Newton's phrase, depicts a "biopostmodernism," "where the biological becomes as plastic as the social" (101). Human biology is seen as malleable and open to human intervention (Newton 110). In order to achieve this human malleability, Sasaki et al. have set their sights on reproducing biologically malleable marmosets. Sasaki and her colleagues promote this malleability as a progressive promissory technology, not least for enhancing stem-cell or gene therapies that are designed to reduce human health hazards. So Sasaki et al. present their research as (potential) progress for humans.

The "creation" of transgenic marmosets as human "models."In the abstract of their article, Sasaki et al. summarize their claim to the value of their work as follows:

> The successful creation of transgenic marmosets provides a new animal model for human disease that has the great advantage of a close genetic relationship with humans. (523)

In biomedical research, nonhuman animals are conceptualized as "models" because, not being human, any effects in nonhuman animals can only imitate those that might occur in humans. Accordingly, "model" refers to a version of human, a version that resembles the human and that can stand in for a human. But genetic research facilitates some remodelling of that which is deemed natural. The genetic makeup of the marmosets may have the potential to be refashioned in order to bring the marmoset closer to human by provoking a predisposition to the development of feared human health conditions. So the emphasis is not on the model as "a standard of excellence"; rather, the transgenic marmoset has the potential to be a "standard of imperfection," whose manipulated genes might be a model for adverse human health conditions. The transgenic marmoset is represented as an artifact, because "model" also invokes an unreal, synthetic human-made "dummy," reinforcing the notion that the nonhuman animal used in experiments is, as Michael Lynch argues, an "'analytic' [object] of technical investigation" (Lynch 266), and as Lynda Birke suggests, "not quite an animal" (214).

This human-made element is emphasized in Sasaki et al.'s suggestion that they have "created" the marmosets. Nonhuman animals used in laboratories are treated as scientific equipment (Birke 210; Lynch 266; Midgley 149) rather than as conscious sentient beings who have desires and preferences (Rowlands 23). Sasaki et al. refer to the marmosets, as human-created scientific possessions who exist purely for the purposes of science, which cements their status as human possessions that exist for human use. As humanly "created" possessions "made" in a laboratory, these nonhuman animals appear to be synthetic commodities. Their standing as synthetic tools rather than as natural beings accentuates their use value and appears to diminish any moral status that they might be accorded. However, as we have seen, Sasaki et al. predict that, after the initial tampering with their genes, the marmosets will reproduce themselves without human interference. This move from human "creation" to natural reproduction does not seem to rule out the representation of the marmosets as human possessions; and indeed it strengthens their use value. According to Sasaki et al.:

> These findings suggest that it should be possible to establish transgenic non-human primate colonies, opening the door to their use in biomedical research. (526)

Of course, via the transgenic modification of nonhuman animals, Sasaki et al. are *tampering with*, rather than *creating,* nonhuman animals. Via natural reproduction the scientists are hoping to facilitate an additional potential supply of "disenfranchised bodies" (Adams 138) for use in the quest to reduce risks to human health. Thus, the production of "primate colonies" could allay worries that this resource might falter. For Sasaki et al. the progress associated with their notion of "creation" is founded in possession and use-value, but "creation" has further connotations, of course.

The word "creation" invokes supreme powers found in religious narratives; via transgenesis Sasaki et al. suggest that they have the potential to create beings in their own (human) image. However, these "creations" will not be any closer to human in outward appearance than non-transgenic marmosets, rather they have the potential for an inner closer "genetic relationship with humans" (Sasaki et al. 523). In this regard, Birke's (219) observation that nonhuman animals used in experiments are "doubly othered ethically" is extended. The marmosets in Sasaki et al.'s laboratory are doubly othered ethically, in Birke's terms, as they are "other" than human (confirmed by their use in the experiments that Sasaki et al. have conducted and want to enable), and they are "not quite an animal" (because the actions against them would normally be forbidden outside the laboratory). They have the potential for a third otherness as well, because their status as transgenic would make them ethically "other" than marmoset. They would not be the same as "natural" marmosets, and consequently they may not receive the ethical consideration accorded to natural nonhuman primates (discussed below). It is this third dimension of ethical "otherness" (resulting from genetic tampering to engender enhanced genetic closeness to humans) that would augment their use value in scientific research focusing on reducing risks to human health. Thus, the scientists are not claiming "creations" in the image of human perfection, rather they seek to "create" marmosets that embody the imperfections that humans seek to eliminate in themselves. This, of course, would be extremely regressive for the marmosets, as their propensity to develop human diseases would prevent them from being perfectly healthy marmosets.

Of course, such potential resonates with public fears about the blurred line between "new genetics" and "eugenics" (for discussion, see Newton 102) and concerns about the morality of genetic modification (e.g., see Macnaghten 535-6), which in turn echoes Beck's paradox (2). Accordingly, fears associated with eugenicist notions of human genetic improvement appear to be produced by the self-same desire that applauds scientific enterprise that seeks to improve human (genetic) health. The scientific enterprise of

Sasaki et al. seems to engage with a form of triangulated eugenics, where human "perfection" is aided by means of human-induced nonhuman animal imperfection. So the progress that Sasaki et al. claim requires the potential genetic deterioration (via the introduction of "faulty" human genes) of the marmosets, which would improve their use value to human health research because their genetic deterioration would have the potential to be employed for the (genetic) improvement of humans. Such notions of progress are bound up with antagonistic conceptualizations of difference from and similarity to the human.

Risk, similarity and difference: the close genetic proximity of transgenic marmosets to humans. For Sasaki et al., a key scientific value of transgenic marmosets is their "close genetic relationship with humans" (523). The plea to similarity with humans is central to biomedical research claims about the utility of nonhuman animal experiments because, without similarities, such research might be deemed futile. Sasaki et al. claim that

> The use of transgenic mice has contributed to biomedical science. However, the genetic and physiological differences between primates and mice — including their neurophysiological functions, metabolic pathways and drug sensitivities — hamper the extrapolation of results from mouse models to direct clinical applications to humans. Thus, the development of non-human primate models that mimic various human systems would accelerate the advance of biomedical research. (523)

Here we encounter paradoxical arguments about the utilization of nonhuman animals in biomedical experiments, a paradox that has been discussed extensively (e.g. see Adams 52; Brown and Michael 10; Peggs, "Hostile World" 94). The paradox involves a scientific justification for nonhuman animal experiments due to sufficient similarity between humans and the nonhuman animals, and an ethical justification due to a sufficient difference between humans and nonhuman animals. As Nik Brown and Mike Michael observe, "similarity in one scientific respect is cancelled by dissimilarity in another" (10); in Carol Adams's phrase, "animals are not like us so we can … animals are like us so we conclude…" (52). In terms of difference, the process of what Suzanne Michel calls, "hyperseparation" (where differences are magnified and similarities minimized) "sets up a hierarchy or unequal relationship" (165) with nonhuman animals categorized as inferior "other." As Janet Alger and Steven Alger observe, the generalized demarcation between human and nonhuman animals is necessary to

> construct beings, who can be used, unimpeded by moral considerations. Those we call animals can be experimented upon, forced to work for us, exploited for our entertainment, and eaten. (203-4)

But, as we have seen, similarity is also imperative. For Sasaki et al., the potential value of the marmosets is their similarity to humans (thus scientifically useful for use in experiments) while not being human (thus ethically acceptable for use in experiments). Of course, Sasaki et al.'s experiments are devoted to the development of transgenic marmosets who would be closer still to humans than marmosets whose genes have not been tampered with, because the ability to "mimic various human systems" associated with feared human health hazards would make transgenic marmosets particularly useful for such research. Sasaki et al. make no mention of moral questions associated with using nonhuman animals in such research and make no reference to any ethical implications that could emerge from experiments using beings who, via scientific tampering, could be close(r) to human. It seems that any such discussion is obviated by the ethical approval they have gained for this work. They state that their research was "approved by the institutional care and use committee and were performed in accordance with Central Institution for Experimental Animals" (527), implying that ethical issues have already been overcome.

The controversy associated with using nonhuman primates in experiments has been much discussed in academic literature (e.g., Singer 139) and in a range of policy documents. For example, the Commission of the European Communities presents a special case for nonhuman primates because of "their genetic proximity to human beings" (15) regarding proposed changes to European Union regulations on nonhuman animal experiments (for discussion see Peggs, "Nonhuman" 11-12). But the problematic hyperseparation of nonhuman primates from human primates is disregarded by Sasaki et al. because it is specifically the proximity of nonhuman primates to human primates that, they argue, makes their use in experiments such a progressive step. Sasaki et al. state that

> even though marmosets are less closely related to humans than either apes or Old World primates, their potential as transgenic primate models of human disease means they may be uniquely valuable. (523)

Unlike great apes, who are often viewed as "honorary humans" (Midgley 147), Sasaki et al. have selected more genetically distant marmosets who are not so "honored." Indeed Sasaki et al. claim that the transgenic marmosets have the potential to be at once "less closely related to humans" and have a "close genetic relationship with humans" (523). Perhaps they intend this more distant closeness to defuse possible controversy.Of course, the introduction of objectionable human genes into nonhuman animals who have a close genetic proximity to humans ethically counteracts Sasaki et al.'s claim to "progress" in a case where there is an ethical position that problematizes experiments on nonhuman animals that have a close genetic relationship with humans. Such an ethical position, evidently, entrenches the human-centred yardstick of moral worth that is used for deciding the moral position that is awarded in the "moral club" (Rowlands 27). The moral unease that positions nonhuman primates above other nonhuman animals paradoxically amplifies Michel's (165) "hierarchy or unequal relationship," because the hyperseparation of primates from other nonhuman animals is based in the value attached to human attributes. Thus Sasaki et al. assert that "[t]he use of transgenic mice has contributed to biomedical science" (523) and mice, like the rats to whom Midgley refers (149), are often seen as laboratory equipment and thus are not granted the moral value given to nonhuman primates. Sasaki et al. claim that their research provides progressive potential on biomedical research that uses transgenic mice. Even a human-centered ethic that regards nonhuman primates as having higher status than other nonhuman animals (let alone an ethic with a wider moral scope) would surely conclude that Sasaki et al.'s research represents moral regression.

Conclusion. Risk is such an important aspect of our lives, according to Beck (19), that it is the current organizing principle. Although Beck focuses his discussion on the ways in which differences in susceptibility to risk (re)produces inequalities among humans, his observations are directly applicable to human and nonhuman animal power relations. In the area of human health this is starkly demonstrated. In seeking to reduce risks to human health, scientists persist in research that increases human-engineered health hazards in nonhuman animals, and there is potential for this as never before. Technological developments mean that nonhuman animals are being genetically predisposed to develop human conditions that we wish to control within ourselves. In an effort to reduce human health hazards, scientific research like that undertaken by Sasaki et al. amplifies the hazards that impose on the health of nonhuman animals by developing techniques that could provide further potential for the use of transgenic nonhuman animals in experiments for human health gains. Thus, human health concerns are individualized; the commodification of nonhuman animals is accentuated via transgenic tampering, and the advances in this area contribute to the sustained view of nonhuman animals used in experiments as merely commodities to be used for human ends. Although experiments using nonhuman primates are considered controversial by many, the proximity of nonhuman primates to humans makes them more functional for research aimed at reducing human health hazards. However, being "bred for purpose," transgenic marmosets are triply othered ethically, which accentuates their distance from the ethical considerations that humans might give to their natural counterparts. Of course, millions of nonhuman animals are experimented upon annually, and the majority of them are not nonhuman primates. Presumed "natural" hierarchical distinctions between humans and nonhuman animals, and among nonhuman animals (with some being judged closer to human and thus more morally worthy), cement a hierarchy based in human attributes. Deemed closeness to humans can, however, be a burden, due to the additional potential health gains that such closeness affords humans.

The commodification of transgenic nonhuman animals is achieved by giving them the possibility of a predisposition to health hazards that we wish to eliminate in ourselves. Like "OncoMouse," the potential development of transgenic marmosets heralds, in Donna Haraway's terms, a "shift from kind to brand" (*Modest Witness* 65-6), a "brand" that embodies a desired potential for human health risk reduction by embodying undesirable human genetic material. Of course, such developments are part of the process of the use of nonhuman animals in experiments that date back to ancient times. Thus the transgenic nonhuman animals that are at the center of Sasaki et al.'s research follow developments that have made possible the further utilization of nonhuman animals in experiments in past times. Does Sasaki et al.'s research indicate progress? In a prize-winning essay, the NASA researcher Natalia Alexandrov proposes that the use of "virtual twins"[3] (which would evolve with each human for testing, assessing, and targeting medication and treatment) will herald the scientific future for the reduction of human health risks. She concludes: "This is the future of virtual twins. And no more animal testing" (6). Such scientific research is surely progressive, as the reduction of human health hazards and the elimination of human and nonhuman animal harms would affirm both scientific and moral progress in biomedical science. This contrasts with the notion of progress suggested by Sasaki et al., a form of progress that relies on the ancient (yet still contemporary) practice of experimenting on nonhuman animals. A wider moral scope extends beyond reiterating human superiority to bringing "the other" nonhuman animal back from "the wasteland of calculated interests to which it had been exiled" (Bauman, *Postmodern Ethics* 84). Interfering with the genetic makeup of nonhuman animals to engender an inclination towards feared health hazards that we seek to eradicate in ourselves represents moral degeneration rather than progress. Whether nonhuman animals are deemed closer to or further from humans, surely they deserve as much protection from health hazards as we want for ourselves.

Notes

1. In 2008 the "Research Defence Society" merged with the "Coalition for Medical Progress" to form "Understanding Animal Research." This new group "aims to achieve broad understanding and acceptance of the humane use of animals in biomedical research in the UK, to advance science and medicine." (Understanding Animal Research 1).

2. I have discussed this elsewhere, e.g, "The social constructionist challenge to primacy identity and the emancipation of oppressed groups: human primacy identity politics and the human/ 'animal' dualism" (2009), and "Human primacy identity politics, nonhuman animal experiments and the oppression of nonhuman animals" (in press).

3. The development of a "virtual twin" would involve blood and tissue data from a new born baby being "transmitted to the simulation and modelling department of the regional medical centre," so that an individual computational model will grow with the human. Tests and check-ups throughout life would be used to update the model and drugs and treatments could be tested on the computational model (the virtual twin) to determine reactions in the human individual (Alexandrov 28).

Works Cited

Adams, Carol J. *Neither Man nor Beast: Feminism and the Defense of Animals*. NY: Continuum, 1995.

Alexandrov, Natalia. "Your Virtual Twin." *New Scientist* 2711 (3 June 2009): 28.

Alger, Janet M. And Alger, Steven F. "Cat Culture, Human Culture: an ethnographic study of a cat shelter." *Society and Animals* 7:3 (1999): 199-218.

Bauman, Zygmunt. *Liquid Modernity.* Cambridge: Polity, 2000.

———. *Liquid Fear*. Cambridge: Polity, 2006.

———. *Postmodern Ethics*. Oxford: Blackwell, 1993.

Beck, Ulrich. *Risk Society: Towards a New Modernity*. London: Sage, 1992.

Beck, Ulrich and Beck-Gernsheim, Elisabeth. *The Normal Chaos of Love*. Cambridge: Polity, 1995.

Birke, Lynda. "Who-or-What is the Laboratory Rat (and Mouse)?" *Society and Animals* 11:3 (2003):

207-224.

Bowcott, Owen. "One in three nurses 'do not want swine flu vaccine.'" *The Guardian.* August 18: 2009: 2.

Brown, N. and Michael, M. "Switching between Science and Culture in Transpecies Transplantation." *Science, Technology and Human Values*. 26:1 (2001): 3-22.

Busfield, Jean. "Pills, Power, People: Sociological Understandings of the Pharmaceutical Industry." *Sociology* 40:2 (2006): 297- 314.

Campbell, Denis. "First swine flu vaccinations on the way for more than 13m Britons." *The Guardian*. August 14, 2009: 4.

Clarke, Adele E., Janet K. Shim, Laura Mamo, Jennifer R. Fosket, and Jennifer R. Fishman. "Biomedicalizaion: Technoscientific Transformations of Health, Illness, and U.S. Biomedicine." *American Sociological Review* 68 (April 2003): 161-194.

Commission of the European Communities. *Proposal for a Directive of the European Parliament and of the Council on the Protection of Animals used for Scientific Purposes*. Commission of the European Communities: Brussels 2008/0211 (COD). 2008.

Crook, Stephen. "Ordering Risks." In *Risk and Sociocultural Theory: New Directions and Perspectives*. Ed. Deborah Lupton. Cambridge: Cambridge UP, 1999.160-85.

Emel, Jody & Wolch, Jennifer. "Witnessing the Animal Moment." In *Animal Geographies: Place, Politics and Identity in the Nature-Culture Borderland.* eds.J. Wolch & J. Emel. London: Verso, 1998. 1-24.

Franklin, Adrian. *Animals and Modern Cultures: A Sociology of Human-Animal Relations in Modernity*. London: SAGE, 1999.

Giddens, Anthony. *Modernity and Self-Identity: Self and Society in the Late Modern Age*. Cambridge: Polity, 1991.

———."Risk and Responsibility" *The Modern Law Review* 62 (1): (1999) 1-10.

Gray, J. *Straw Dogs: Thoughts on Humans and Other Animals.* London: Granta, 2003.

Greek, C. Ray, and Jean Swingle Greek. *Specious Science: How Genetics and Evolution Reveal Why Medical Research on Animals Harms Humans.* New York and London: Continuum, 2002.

Halpin, Zuleyma Tang. "Scientific Objectivity and the Concept of 'The Other.'" *Women's Studies International Forum* 12:3 (1989): 285-294.

Haraway, Donna J. *Simians, Cyborgs, and Women: The Reinvention of Nature*. London: Free Association Books, 1991.

———. *Modest witness@second millenium: Femaleman meets OncoMouse.* London: Routledge, 1997.

Henry, Bill, and Roarke Pulcino. "Individual Differences and Study-Specific Characteristics Influencing Attitudes about the Use of Animals in Medical Research." *Society and Animals* 17: 4 (2009): 305-324.

Hesman Saey, Tina. "Four Marmosets are First Transgenic Primates: Foreign gene successfully introduced and also passed on to offspring." *Science News*. 175:13 (June 20, 2009): 13. http://www.sciencenews.org/view/generic/id/44202/title/Four_marmosets_are_first_transgenic_pri... Dowloaded 19 August 2009.

Ingham, Richard. "World First: Japanese Scientists Create Transgenic Monkeys." *AFP*. May 27 2009. http://www.google.com/hostednews/afp/article/ALeqM5gMNh_HguY6DOVeB_xDu4EWa4h23A. Dowloaded 24 January 2011.

Kerr, Anne, and Sarah Cunningham-Burley. "On Ambivalence and Risk: Reflexive Modernity and the New Human Genetics." *Sociology* 34:2 (2000): 283-304.

Knight, Andrew. "Systematic Reviews of Animal Experiments Demonstrate Poor Contribution Toward Human Health Care." *Reviews on Recent Clinical Trials.* 3 (2008): 89-96.

Latour, Bruno, and Woolgar, Stephen. *Laboratory Life: The Social Construction of Scientific Facts*. London: Sage, 1979.

Le Breton, David. "Genetic Fundamentalism or the Cult of the Gene." *Body and Society* 10:4 (2004): 1-20.

Lynch, Michael E. "Sacrifice and the Transformation of the Animal Body into a Scientific Object: Laboratory Culture and Ritual Practice in the Neurosciences." *Social Studies of Science* 18:2 (1988): 265-289.

Macnaghten, P. "Animals in Their Nature: A Case Study on Public Attitudes to Animals, Genetic Modification and 'Nature.'" *Sociology* 38:3 (2004): 533-551

Metzler, Ingrid. "'Nationalizing Embryos': The Politics of Human Embryonic Stem Cell Research." *Biosocieties* 2:4 (2007): 413-428.

Michael, Mike. 1992. "Lay Discourses of Science: Science-in-General, Science-in-Particular, and Self." *Science, Technology and Human Values*. 17:3 (1992): 313-333.

Michael, Mike, and Lynda Birke. "Accounting for Animal Experiments: Identity and Disreputable 'Others.'" *Science, Technology and Human Values*. 19:2 (1994): 189-204.

Michel, Suzanne M. "Golden Eagles and the Environmental Politics of Care." In *Animal Geographies: Place, Politics and Identity in the Nature-Culture Borderland.* Eds. J. Wolch & J. Emel. London: Verso, 1998. 162-87.

Midgley, Mary. *The Myths We Live By*. London: Routledge, 2004.

Newton, Tim. *Nature and Society*. Oxford: Routledge, 2007.

Patent Watch. 2004. "OncoMouse patent restricted in Europe again." *Nature Reviews Drug Discovery* 3:728 (September 2004).

Peggs, Kay. "A hostile world for nonhuman animals: human identification and the oppression of nonhuman animals for human good." *Sociology*43:1 (2009): 85-102 .

———."Human primacy identity politics, nonhuman animal experiments and the oppression of nonhuman animals." In R. Carter and N Charles, eds. *Human and Other Animals: Critical Perspectives*. Basingstoke: Palgrave Macmillan (in press).

———."Nonhuman animal experiments in the European Community: human values and rational choice." *Society and Animals* 18:1 (2010): 1-20.

———."The social constructionist challenge to primacy identity and the emancipation of oppressed groups: human primacy identity politics and the human/ 'animal' dualism." *Sociological Research Online* 14:1 (2009). http://ideas.repec.org/a/sro/srosro/2008-57-2.html. Dowloaded 24 January 2011.

Research Defence Society. "Medical Advances and Animal Research. The Contribution of Animal

Science to the Medical Revolution: Some Case Histories.” RDS: Understanding Animal Research in Medicine and Coalition for Medical Progress, 2007. 24 January 2010. http://www.understandinganimalresearch.org.uk/resources/document_library/download_document/?document_id=8.

Rowlands, Mark. *Animals Like Us.* London: Verso, 2002.

Rupke, Nicholas, ed. *Vivisection in Historical Perspective*. Beckenham: Croom Helm, 1987.

Sasaki, E., H. Suemizu, A. Shimada, K. Hanazawa, R. Oiwa, M. Kamioka, I. Tomioka, Y. Sotomura, R. Hirakawa, T. Eto, S. Shioszawa, T. Maeda, M. Ito, R. Ito, C. Kito, C. Yahihashi, K. Kawai, H. Miyoshi, Y. Tanioka, S. Habu, H. Okano, and T. Nomura. “Generation of transgenic non-human primates with germline transmission.” *Nature* 459 (May 28, 2009): 523-527.

Schatten, Gerald, and Shoukrat Mitalipov. “Developmental Biology: Transgenic Primate Offspring.” *Nature* 459 (May 28, 2009): 515-516.

Shilling, C. *The Body and Social Theory*. London: Sage, 1993.

Singer, Peter. *Unsanctifying Human Life.* Ed.H. Kuhse. Oxford: Blackwell, 2002.

Smart, Barry. *Facing Modernity*, London: SAGE, 1999.

Strydom, Piet. *Risk, Environment and Society: Ongoing Debates, Cultures, Issues and Future Prospects*, Buckingham: Open UP, 2002.

Tulloch, J. and D. Lupton. *Risk and Everyday Life*. London: SAGE, 2003.

Turner, Brian. “Social Fluids: Metaphors and Meanings of Society.” *Body and Society* 9:1 (2003): 1-10.

Turner, Brian S. “Culture, Technologies and Bodies: the Technological Utopia of Living Forever.” *The Sociological Review*: 55:1 (2007):19-36

Understanding Animal Research. *About Us* . 25 November 2010. Web. http://www.understandinganimalresearch.org.uk/about_us/

Welchman, J. “Xenografting, Species Loyalty, and Human Solidarity.” *Journal of Social Philosophy* 4:2 (2000): 244-255.

Wilkinson, Iain. *Risk, Vulnerability and Everyday Life*. London: Routledge, 2010.

Wooffitt, Robin. *Conversation Analysis and Discourse Analysis: A Comparative and Critical Introduction.* London : SAGE, 2005.

Zola, J. C., J.A. Sechzer, J.E. Sieber, and A. Griffin, A. “Animal Experimentation: Issues for the 1980s.” *Science, Technology and Human Values.* 9:2 (1984): 40-50.