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Human-Animal Transgenesis and Chimeras Might Be an Expression of Our Humanity

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Jason Scott Robert and Françoise Baylis (2003) identify important scientific advances that have massive social implications. I have written on the ethical implications of these advances elsewhere (Savulescu 2003). Here I can sketch only a framework for evaluating these advances. In what follows, I will use “animal” to refer to “nonhuman animal.”

Possibilities

Robert and Baylis are right that there are scientific experiments that introduce human genes and embryonic stem cells into animals to create animal-human chimeras. But it is now also possible to introduce animal genes into human beings by germ-line genetic manipulation. It is also possible to introduce totipotent or pluripotent cells from animals to make more full-blown human-animal chimeras. For example, it would be a straightforward technical matter to fuse a human embryo and a chimp embryo. The resulting human-chimp chimera might be viable. Any resulting being would be a blend of the properties of each. While the resulting chimera might not look like one of the apes from the film Planet of the Apes (though it might), it would look and be very different than a human being or an ape.

What might be reasons for creating transgenic human beings and full-blown human-animal chimeras? Some of these reasons would be questionable: commercial exploitation of “freaks”; artistic motivation (which led to the creation of the fluorescent rabbit “Alba” by French scientists); or curiosity, just to see what it is like, as Dawkins memorably said in connection with cloning. But there might be good reasons to radically alter human beings.

Medical Purposes

At a basic level, human-animal chimeras offer the opportunity to study cellular maturation and migration, as well as oncogenesis.

Chimeras might have unique properties as a source of embryonic stem cells. Robert and Baylis point out that human-cow (and indeed human-pig) chimeras have already been produced as a source of stem cells.

Or consider the case of the human immunodeficiency virus (HIV). HIV is rampant. At the present time there is no cure or vaccine. Imagine that scientists discover that some species are resistant to HIV infection and that resistance is genetically encoded. Imagine that it becomes possible to introduce these gene sequences into the human genome in order to confer resistance to HIV. While this is speculative, it is not absurd.

It would also be possible to create very weak chimeras. It is theoretically possible that a single or a few animal embryonic cells among, say, 16 human cells would be enough to confer resistance to diseases by producing certain protein products or having some kind of immunological effect. This would be a weak chimera that is predominantly human.

More radically, it is theoretically possible to combine a number of pluripotent or totipotent stem cells from a number of different animal embryos into the human embryo. Or, one might introduce animal genes from several different species into a human embryo. The resulting entity might have unique and desirable immunological properties or properties that render it more resistant to disease.

Delay Aging or Prolong Human Life

For some time we have been aware that the phenomena of aging in human beings is related to the degradation of telomeres, the regions on the end of our chromosomes (Rudolph et al. 1999). Suppose that we were to find that animals that have a significantly longer lifespan than human beings, such as turtles, contained genetic sequences that reduced the rate of telomere degradation. It might then be possible to transfer these sequences into the human genome, radically prolonging life or compressing aging. This would be enhancement for radically longer life or less aging, but it seems good, at least from the prudential point of view.

Enhance Human Capabilities

There is some evidence that elephants have highly developed social memory and that this leads to greater reproductive success (McComb et al. 2001). Transfer of the relevant genes from elephants to human beings might be desirable if the genes improved social memory.

Or imagine it is possible to transfer the gene responsible for enhanced night vision in animals such as rabbits and owls and other nocturnal creatures into the human genome. This might result in many benefits to the human race. Car accidents at night would become a less frequent occurrence, search-and-rescue teams would not have to call off their searches as the sun went down, and city
streets after nightfall would be considerably safer places to be.

What if it were possible to enhance not only the night vision of human beings but also their ability to navigate in the dark by transferring the gene or genes that encode bat sonar? An enhanced ability to navigate in conditions where vision is hindered could be of great benefit to people such as pilots and members of the emergency services.

It is at least theoretically possible that such genetic alterations could be turned on and off at will through the use of genetic modulators.

Robert and Baylis's Moral Confusion

In the section entitled “Moral Confusion,” Robert and Baylis make several moral claims that are wrong:

the engineering of creatures that are part human and part nonhuman animal is objectionable because the existence of such beings would introduce inexorable moral confusion in our existing relationships with nonhuman animals and in our relationships with part-human hybrids and chimeras. The moral status of nonhuman animals, unlike that of human beings, invariably depends in part on features other than species membership, such as the intention with which the animal came into being. . . . [M]oral status is contingent on the will of regnant human beings.

Robert and Baylis then go on to give examples, claiming that the moral status of animals and the nature of moral obligation depends on the purposes for which animals are bred, including for sports such as hunting. They claim that human beings have an inviolable right to life whereas an animal’s right to life depends on whether human beings choose to confer a right to life, based in some circumstances on whether they judge the animal cute or ugly.

asking—let alone answering—a question about the moral status of part-human interspecies hybrids and chimeras threatens the social fabric in untold ways; countless social institutions, structures, and practices depend upon the moral distinction drawn between human and nonhuman animals. Therefore, to protect the privileged place of human animals in the hierarchy of being, it is of value to embrace (folk) essentialism about species identities . . . . The notion that species identity can be a fluid construct is rejected, and instead a belief in fixed species boundaries that ought not be transgressed is advocated.

One can imagine the old-style racists in the United States offering a similar argument:

asking—let alone answering—a question about the moral status of mixed race marriages and offspring threatens the social fabric in untold ways; countless social institutions, structures, and practices depend upon the moral distinction drawn between whites and blacks. Therefore, to protect the privileged place of whites in the hierarchy of being, it is of value to embrace (folk) essentialism about racial identities . . . . The notion that racial identity can be a fluid construct is rejected, and instead a belief in fixed racial boundaries that ought not be transgressed is advocated.

How absurd such claims sound now.

Humanity and What Matters

Robert and Baylis sometimes wish to distance themselves from anthropocentrism, at least the direct sort. “Some (including ourselves) will claim that the biological term human should not be conflated with the moral term person.” This claim is difficult to reconcile with the claims made above. The central questions (which Robert and Baylis do not answer) are: Does species membership matter morally? If it does not matter, what does matter?

McMahan (2002) gives a definitive refutation of anthropocentrism, including the social constructivist (he calls it “co-membership as a special relation”) account alluded to by Robert and Baylis. There is not enough space to repeat McMahan’s arguments here. In short, why should whatever we take to be definitive of species be morally important? For example, why is the capacity to interbreed morally important? How does it confer a right to life that is categorical in some circumstances and conditional in others? Why does having a certain genetic structure, for example 46 chromosomes, morally matter? Some human beings do not have 46 chromosomes and cannot interbreed (e.g., Turner’s syndrome with a missing X chromosome).

Any attempt to base moral status on biology is fundamentally flawed. Genes, cells, organs, or bodies are not what matter intrinsically. We share about 98.5% of our DNA with chimps, and the differences between us and chimps might not be due entirely to the 1.5% of DNA that is different but rather to the regulation of the genes that we have in common with chimps. What is special about Homo sapiens compared to all other animals? The answer is not to be found in biology but in certain psychological characteristics. There are several candidate properties that differentiate us from other animals:

1. capacity to reason
2. capacity to act from normative reasons, including moral reasons
3. capacity to act autonomously
4. capacity to engage in complex social relationships
5. capacity to display empathy and sympathy
6. capacity to have faith (believe in a god)

I believe one necessary (but perhaps not sufficient) condition of humanity is the capacity to act on the basis of normative reasons. Let’s assume this quality is one of the essential elements of humanity. Let’s call this the capacity to display practical rationality. Animals have desires and
wants about what to do. Human beings alone have beliefs about what they should do. Human beings sometimes act on the basis of these.

Consider an example. Animals respond to a biological urge to reproduce. Human beings make decisions about when to have children, how many children to have, and what kind to have through prenatal or preimplantation genetic diagnosis. These kinds of normative judgments are paradigmatically human.

**What Constitutes a Threat to Humanity?**

If our humanity is located, at least in part, in our practical rationality (in our capacity to make normative judgments, including moral judgments, and act on these), then there are two ways in which our humanity can either be promoted or threatened.

**Actions that Are an Expression of Our Humanity**

Actions that are the reflection of our practical rationality express our humanity. When we act according to what we have good reasons to do, we express our humanity. So whether creating transgenic human beings or chimeras is an expression of our humanity or a threat to it turns on whether we have good reason to radically alter our genome.

In this regard it is not possible to speak generally about whether such alterations are an expression or threat to humanity. Some radical genetic alterations are an expression of our humanity, while others are not. For example, the introduction of animal DNA into human beings to protect them from an uncontrollable HIV pandemic would be an expression of our humanity—we have good reason to prevent HIV. The creation of human-chimp chimeras for entertainment or to act as slaves (like pets?) or to experience severe pain in medical experiments would not be an expression of our humanity—there might be good reasons not to create chimeras for these purposes.

Radical genetic alteration of human beings is not necessarily a threat to our humanity. Whether it is an expression or threat depends on whether there are good reasons for or against the alteration in question. Simply the fact that such alterations are unnatural or cross the human-animal divide does not imply they are a threat to our humanity. In many cases there will be good reasons to alter human beings to enable them to have better lives.

**Effect on the Capacity for Practical Reasoning**

If practical rationality is central to our humanity as members of the species *Homo sapiens*, then there is a second way in which radical genetic alteration could threaten our humanity. It could do so by undermining the capacity of the altered being to engage in practical reasoning—reasoning about what it should do.

Introducing into human beings genes from ferocious animals might make for better boxers or soldiers but might also inhibit the human beings’ capacity to reason and reflect. They would be more like animals than human beings.

In other cases the introduction of animal genes might have no effect on the capacity to reason—introduction of genes to protect against disease or improve our sensory faculties would be examples. These do not threaten our humanity, though a human person with bat sonar would be a very different kind of human.

Indeed, the introduction of animal genes might promote our capacity to reason and act on our value judgments. This is probably true of sensory enhancement because such enhancement would increase the power of an agent to affect the world and so act on normative reasons. For example, a man who believed he should go out and rescue a stranger lost at night in a forest would be more likely to find the person if he had acute night vision.

Similarly, if the introduction of genes from elephants or other animals resulted in the radical prolongation of human life or enhancement of memory, then this would improve the opportunities for learning and for making more rational judgments, as well as increasing the efficiency of transmission from judgment to action. Improvement of our cognitive abilities might improve our capacity to reason. Improvement in empathy might improve our moral reflection.

Whether transgenesis and the creation of human-animal chimeras threaten humanity depends on what effects these changes have on the essential features of humanity. In some cases creating chimeras or transgenic human beings will reduce these features. But in many other cases these changes will promote our humanity.

Bringing animals closer to human beings to share their genes might paradoxically improve our humanity, what is essentially human. Humanity until this point has been a story of evolution for the survival genes—survival and reproduction. Now we are entering a new phase of human evolution—evolution under reason—where human beings are masters of their destiny. Power has been transferred from nature to science. Science can create abominations, but it can also be the instrument of humanity.

We are lucky to have our biology. If evolution had gone another way, rational beings might not be. But we should not engage in biology worship. Our biology is not sacrosanct. We should change it to make our lives longer and better.

What matters are mental states, qualities of our mental lives. I believe what matters and what defines our humanity is, at least in part, our rationality. Actions that express or promote rationality are expressions of our humanity. Insofar as transgenesis and the creation of hu-
man-animal chimeras both promote and express our rationality, it is the essential expression of our humanity.

**Moral Confusion and Bioethics**

We might be confused about the status of such interspecies beings, and this might create social disorder. As Robert and Baylis note, many people are confused about many things, for example, the moral status of children produced by two nuclear genetic donors and a different mitochondrial donor, gestated by a different surrogate, and raised by different surrogate parents. People have been confused about the moral status of clones, claiming they lack autonomy. People are confused about the moral status of embryonic stem cells—some have argued they should be treated like embryos. We should not base social policy and law on such confusions, especially when such policies harm people (making them worse off than they could have been). Racists were confused about the moral status of race. The social costs of acceding to irrational confusion are, at least historically, much greater than the costs of clearing it up and reforming society. People are confused about the moral significance of genetics and biology in general. Our job is to clear this up (as philosophers such as McMahan have tried to do), not to perpetuate it or allow it to persist or base social policy on it.

In the future, cyborgs and artificial intelligence will throw up even greater challenges to our conception of what matters. No doubt many people would find the introduction of animal genetic material into human beings more repugnant and bestial than the introduction of nonbiological material. But the scope for change and enhancement is limited in the plant and animal kingdoms by the range of genes that occur naturally. The scope for radical differences in artificial life are far greater. Unless we begin to understand what is good and ought to be promoted and what is bad and ought to be prevented, we will be in no position to evaluate these rapidly advancing scientific possibilities.

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**References**


**What’s Wrong with Confusion?**

Hilary Bok, Johns Hopkins University

In their thought-provoking paper, Jason Scott Robert and Françoise Baylis (2003) argue that

the engineering of creatures that are part human and part nonhuman animal is objectionable because the existence of such beings would introduce inexorable moral confusion in our existing relationships with nonhuman animals and in our future relationships with part-human hybrids and chimeras.

It is not clear to me whether Robert and Baylis endorse this objection or offer it as an explanation of why chimeras worry other people. In either case, however, it is worth asking whether it is a good objection. In what follows I raise three questions about it.

First, how confusing will human-nonhuman chimeras actually be? Some of the more outlandish chimeras—for instance, a human being with the brain of a mouse—might be quite confusing. However, it is not clear that this is true of chimeras per se. As Robert and Baylis point out, there is no commonly accepted account of what marks one species off from another. We simply “know a human being when we see one.” Our rough division of animals into species has, thus far, been able to accommodate human-nonhuman chimeras. Most people seem quite comfortable with the idea that Jesse Helms is human, even though, as a recipient of a transplanted pig valve, he is technically a human-nonhuman chimera. And most people would probably count the OncoMouse as an unusual...