24. Collins, *The Hunger Games*, 343.

25. For a discussion of how Thomas Hobbes's views of human nature influenced his political philosophy, see chapter 14, "'Safe to Do What?': Morality and the War of All against All in the Arena."

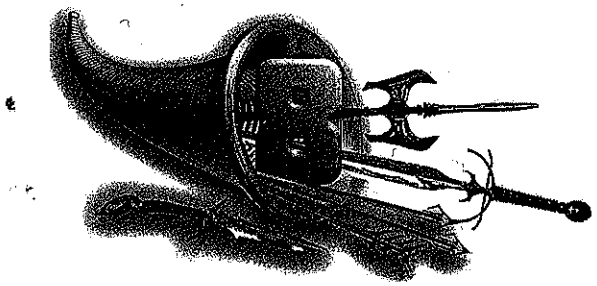
26. Thomas Hobbes, *On the Citizen*, ed. Richard Tuck and Michael Silverthorne (New York: Cambridge University Press, 1998), 52.

27. Richard Dawkins, *The Selfish Gene* (New York: Oxford University Press, 1976), 26.

28. David Hume, *An Enquiry Concerning the Principles of Morals* (New York: Oxford University Press, 1998), 110.

29. Collins, *Mockingjay*, 367.

30. Ibid., 398.



"NO MUTT IS GOOD"—REALLY?

Creating Interspecies Chimeras

Jason T. Eberl

Katniss Everdeen and her fellow tributes face many challenges in the Hunger Games arena, the most fearsome being one another. But the second most fearsome threat has to be the *muttations*, creatures like the tracker jackers, with their madness-inducing venom, and the wolflike animals with the eyes of deceased tributes that make Cato's death in the 74th Hunger Games the most drawn out and gruesome of all.

Those aren't the only mutts to have been produced by the Capitol's malevolent scientists. During the rebellion that ended with the Treaty of Treason, which instituted the Hunger Games, the Capitol produced a variety of hybrid and chimeric (the difference between these is explained in the next section) insects and animals with specifically engineered traits to be deployed for acts of espionage, terror, and sheer violence. These transspecies weapons of war are more than just tools exemplifying the Capitol's technological superiority. They are also signs of scientific hubris: attempts to manipulate nature to

human ends. But is messing around with Mother Nature—or, as some describe it, "playing God"—always inherently *bad*? Might there be some nondestructive purposes that certain types of mutts could serve?

Although contemplating these questions may at first seem like a purely academic exercise for philosophers and ethicists, the truth of the matter is that science fiction often finds a way of becoming science fact. The particular muttations in the Hunger Games trilogy are fantasy creatures, but other types of mutts have already been created in the real world, and more will certainly be engineered in the future.

Transspecies entities that have been created by combining DNA from two different species of nonhuman animals have aroused scientific curiosity. There have also been chimeras produced from combinations of human and nonhuman DNA. Some of these have merely raised a few eyebrows, but scientists have envisioned other forms of human-nonhuman chimeras that truly push the boundaries of morality, perhaps even to the breaking point, and challenge our concept of what it means to be human.

"A Mix of Human and Lizard and Who Knows What Else"

The mutts described in the Hunger Games trilogy are of two kinds: *hybrids* and *chimeras*. Both terms refer to an organism that possesses DNA from two different species, but they differ in how the two species' genomes are combined. In the case of a hybrid, each cell of its body has DNA from both species, resulting in a creature that is a blend of the two through interspecies mating. The best known real-world example is the mule, the hybrid offspring of a male donkey and a female horse. In the world of Panem, mockingjays are hybrids produced by the mating of genetically engineered jabberjays and natural mockingbirds.

Chimeras, on the other hand, are created by grafting cells from one species into the embryo of another species, resulting in a creature that has some body parts from one species and some body parts from the other species. In 1984, scientists created geeps, animals made out of goat and sheep DNA.[1]

Another example of a chimera, this one involving human DNA, is the SCID-hu mouse,[2] which looks and acts just like a normal mouse but has a human immune system.[3] The SCID-hu mouse allows scientists to study immune-related diseases, such as HIV, using experiments that are too risky to be done with human beings. For example, you couldn't intentionally infect someone with HIV in order to observe how the virus takes hold and then propagates itself throughout the body, but researchers permit themselves to do this to mice.[4]

Jabberjays, before they mate with mockingbirds to create a new species, appear to be chimeras, since they're regular homing birds in all respects except for their novel ability to mimic human speech: "The jabberjays were muttations, genetically enhanced male birds created by the Capitol as weapons to spy on rebels in the districts. They could remember and repeat long passages of human speech, so they were sent into rebel areas to capture our words and return them to the Capitol."[5]

The real-world possibility of creating jabberjays is demonstrated by a dramatic experiment involving a chicken-quail chimera. Neuroscientist Evan Balaban and his colleagues took small sections of the brain of a developing quail and transplanted them into the developing brain of a chicken, creating a chicken that exhibited the vocal trills and head bobs unique to a quail. The experiment thus provided evidence that complex behaviors could be transferred across species.[6]

Even though geeps and SCID-hu mice raise ethical questions pertaining to the use of animals in medical experimentation and more general concerns about the morality of human beings taking control of the evolutionary process, the creation of such entities has largely flown under the public radar.[7]

After all, a mouse with human DNA doesn't appear to be problematic as long as it looks, walks, and acts just like a mouse. But what about a hybrid or a chimera that in some ways looks, walks, and acts—and maybe speaks, too—just like a *person*?

"An Eerily Human Quality"

Toward the end of the 74th Hunger Games, when only Katniss, Peeta, and Cato remain, the Gamemakers unleash their final terror upon the tributes. "Muttations," says Katniss. "No question about it. I've never seen these mutts, but they're no natural-born animals. They resemble huge wolves, but what wolf lands and then balances easily on its hind legs? What wolf waves the rest of the pack forward with its front paw as though it had a wrist?"[8] Soon Katniss is face-to-face with this new breed of mutt: "The green eyes glowering at me are unlike any dog or wolf, any canine I've ever seen. They are unmistakably human. And that revelation has barely registered when I notice the collar with the number *1* inlaid with jewels and the whole horrible thing hits me. The blonde hair, the green eyes, the number . . . it's Glimmer."[9]

By sending wolves engineered with the DNA of the now-deceased tributes that Katniss has fought against or alongside in the arena, the Gamemakers add a new dimension of horror to the struggle to survive. "No mutt is good. All are meant to damage you," Katniss observes. "However, the true atrocities, the most frightening, incorporate a perverse psychological twist designed to terrify the victim. The sight of the wolf mutts with the dead tribute's eyes. The sound of jabberjays replicating Prim's tortured screams. The smell of Snow's roses mixed in with the victims' blood."[10]

Although Katniss is initially shocked when she finds herself looking into Glimmer's green eyes, an even more disturbing thought soon occurs to her: "Their eyes are the least of my worries. What about their brains? Have they been given any of the real tributes[']memories? Have they been programmed to hate our faces particularly because we have survived and they were so callously murdered? And the ones we actually killed . . . do they believe they're avenging their own deaths?"[11]

A mutt with clear human features—especially facial features like eyes—is sufficiently macabre to raise the hairs on the back of anyone's neck. But behavior that suggests that this mutt might also have the thoughts and memories of a deceased human being—someone we knew—would trigger an innate repugnance in just about anyone. Although a feeling of repugnance alone doesn't dictate that something is morally wrong, it's at least an indicator that something is amiss and warrants careful ethical investigation.[12]

How concerned should we be that a human-nonhuman chimera that looks, acts, and perhaps even thinks like a person might one day be created? What ethical and practical parameters should guide scientists as they move closer and closer to the possibility of creating such a being? A first step to answering these questions is to define what a *person* is and to what extent being human makes one a person.

Philosophers have long drawn a distinction between *rational* and *nonrational* animals.[13] Human beings have traditionally been understood to be the only species of rational animal, which has encouraged some to believe that we occupy a privileged position as rightful rulers over the rest of the animal kingdom. This belief has often been supported by religious doctrine, as expressed in Psalms 8:4–9 (New American Bible translation):

> When I see your heavens, the work of your fingers, the moon and stars that you set in place—What are humans that you are mindful of them, mere mortals that you care for them? Yet you have made them little less than a god, crowned them with glory and honor. You have given them rule over the works of your hands, put all things at their feet: All sheep and oxen, even the beasts of the field, the birds of the air, the fish of the sea, and whatever swims the paths of the seas.

But rational animals aren't necessarily restricted to *Homo sapiens*. Even though traditional philosophers have generally thought that human beings were the only rational animals on our planet, the continued study of dolphins, chimpanzees, gorillas, elephants, and other animals with highly developed cognitive skills may eventually require us to include those species in the class of rational animals as well.[14]

Is being human—or being a rational animal—the same as being a person? The term *person* has historically been understood to refer to a being with a moral significance that elevates it above other types of beings, a significance derived from its possession of rationality. Generally, to be a person means to be a full member of the moral community.[15]

This privilege of personhood hasn't always been granted to all human beings. Institutions like slavery are made possible when a group of human beings is defined as nonpersons, eligible to be owned and exploited by others. Likewise, the Gamemakers don't really think of the tributes as persons, but rather as property to be used and abused at the Capitol's whim.

The category of nonperson has also traditionally been thought to include all nonhuman animals, despite the fact that many of them are thinking, feeling, sentient beings. How ironic that societies will define a monster like President Snow as a person and treat him as a member of the moral community, whereas peaceful gorillas who can communicate using human sign language and create impressionistic paintings are regarded as less than persons and treated as property.[16]

Is there an objective definition of personhood that isn't just an excuse to force others to till our fields or fight to the death in the arena? The earliest philosophical definition of personhood comes from Anicius Manlius Severinus Boëthius (ca. 480–524), who defined a person as an "individual substance [or being] of a rational nature."[17] This definition held the field in the Western world for more than a millennium and was used by Christian scholars to identify various types of

nonhuman persons, such as angels and the three persons of the Christian Trinity.[18]

At the dawn of the modern era, the philosopher John Locke (1632–1704) offered an alternative definition of a person as "a thinking intelligent Being, that has reason and reflection, and can consider itself as itself, the same thinking thing in different times and places."[19] This definition allows for the possibility of myriad species of nonhuman persons. It also leaves us wondering where muttations with the memories of human tributes might fit in. After all, if they can seek to avenge the grievances of those tributes whose memories they possess, aren't they exercising self-conscious thought and reflection?

Contemporary philosophers generally accept the definition of a person as any being with the capacity for self-conscious rational thought—augmented, perhaps, by other capacities, such as using language to communicate, having nonmomentary self-interests, and possessing moral agency or autonomy.[20] The different ways of defining personhood that we've considered aren't necessarily mutually exclusive. In fact, they all make the possession of a capacity for either rationality or self-consciousness the minimum threshold for being counted as a person.

"Animals in Nature Don't Act Like This"

Although it's clear that the human beings who inhabit Panem qualify as persons under any reasonable definition, matters aren't so clear when it comes to the various muttations that the Capitol has engineered. Jabberjays, for instance, can memorize human speech and repeat it verbatim. The relevant question, however, is whether the jabberjays *understand* what they hear and later vocalize. They seem like mere biological recording devices that no more understand the sounds they memorize than a Memorex tape does.

Tracker jackers—genetically engineered wasps—seem to be highly intelligent muttations, having the ability to home in

on a particular person and coordinate a deadly attack en masse. But what's not evident is whether tracker jackers have self-conscious first-person thoughts like "Let's attack this person who disturbed our nest!"[21]

Katniss is suspicious of the wolves, who clearly have been designed with DNA from human beings and might therefore potentially have the ability to think just like the persons from whom they were created. But having some cells with human DNA doesn't automatically make a human-nonhuman chimera into a person. In fact, given the philosophical definitions of personhood we've been considering, even a creature with cells that *all* have human DNA might not be a person. For example, some human pregnancies result in what's called a *hydatidiform mole*, a mass of placental tissue with the same genetic identity as a human embryo. Unlike an embryo, however, a hydatidiform mole will never develop a functioning brain, despite possessing a full set of human chromosomes. The same applies to some genetically defective embryos.

Notice, however, the difference between the reason the Gamemakers regard tributes as less than persons and the reason a hydatidiform mole isn't considered a person: one is defined as less than a person so that it can be abused, whereas the other simply doesn't meet the rationality criterion required by most philosophical definitions of personhood.

A SCID-hu mouse with a complete human immune system is still clearly a mouse.[22] But could we eventually create other human-nonhuman chimeras with humanlike brains that support self-conscious, rational thought? If we could engineer such a creature by grafting human cells into a nonhuman embryo, the result would certainly be a rational animal—possibly even more so than Katniss imagines of the mutts who kill Cato. But if the engrafted human cells were insufficient for the embryo to develop self-conscious, rational thought, it would remain a nonrational animal, regardless of any other human traits it might develop, like the jabberjays

who have the ability to merely mimic human speech without understanding it.

How likely is it that we could confer a capacity for self-conscious, rational thought by grafting human cells into a nonhuman embryo? We'll never know for sure until the day these entities are actually created and allowed to develop to maturity. Therein lies the rub, for such an experiment would run afoul of some pretty basic ethical protocols. For instance, in the event that the chimera we've created really is a person, we would be violating its fundamental moral rights by keeping it captive in a lab and subjecting it to experimental research without consent.

Not very long ago, the Nazis declared the Jews to be *untermenschen* ("subhuman") and the founders of the American Republic crafted a Constitution that counted a slave of African descent as only three-fifths of a person. Even today, we can't agree whether some human organisms (embryos and fetuses) or any nonhuman animals qualify as persons. Given all of this, it's probably best not to risk further blurring the boundaries that exist between animals with human DNA who are unquestionably persons—such as you and me—and other animals with human DNA that aren't persons.[23] Unfortunately, in this matter, as in so many others, decision makers in the Capitol seem to lack even the most minimal moral scruples.

Ethicists have green-lighted some human neural stem cell experiments, such as Stanford University professor Irving Weissman's creation of a human-mouse neural chimera, in which human neural stem cells were grafted into mouse fetuses to produce brains that are about 1 percent human.[24] But ethicists are more hesitant about human neural stem cell experiments with primates, since these biological relatives of ours might have the cranial capacity to develop a human-size brain.

In one such experiment, several million human neural stem cells were grafted into the brains of African green monkeys—a close evolutionary cousin of *Homo sapiens*—by researchers looking for a treatment for Parkinson's disease. Although the

resulting chimeras were closely monitored to make sure that they didn't exhibit any behavioral traits associated with personhood, such signs aren't always clearly evident and may go unnoticed.[25]

It might be very difficult to determine whether a mutattion meets the criteria for personhood. Confronted with lizard-human muttations, Katniss observes behavior that is clearly bestial:

> For the first time, I get a good look at them. A mix of human and lizard and who knows what else. White, tight reptilian skin smeared with gore, clawed hands and feet, their faces a mess of conflicting features. Hissing, shrieking my name now, as their bodies contort in rage. Lashing out with tails and claws, taking huge chunks of one another or their own bodies with wide, lathered mouths, driven mad by their need to destroy me.[26]

Does this description imply that these mutts aren't rational animals? Violent, self-destructive behavior driven by a need to destroy their prey doesn't sound like the behavior of rational, self-conscious creatures. Yet they're also capable of feeling rage and vocalizing Katniss's name. Are they merely repeating sounds mindlessly, as the jabberjays do? Are rage and other so-called base emotions the only ones they're capable of feeling? Perhaps so, but that's far from obvious. The real question is whether these mutts are merely threats to Katniss's survival or whether they're also fellow victims of the Gamemakers' cruelty. Who are the *real* beasts in this contest?

If these mutts are indeed chimeras with a sufficiently human genetic endowment to have developed brains that can support self-conscious, rational thought, then they are persons whom the Capitol has unconscionably manipulated for its own wicked ends. In most cases of human-nonhuman chimeras, however—those that don't involve grafting neural stem cells into primate embryos—the risk that a rational animal,

a person, will be created is low enough to allow potentially beneficial research to proceed here in the real world.

Weaponizing chimeras, as the Capitol scientists have done, is certainly not on anyone's agenda yet—at least, not that we know of. The Hunger Games trilogy is a cautionary tale, warning us of what might happen if we don't keep a close eye on scientific research on muttations in our own world; such research is already quite advanced and is capable of helping us to develop treatments for various, currently incurable, diseases, as well as creating either heinous, unnatural weapons or rational, self-aware persons whom we'd likely treat as monsters.

NOTES

1. For further discussion of the various types of hybrids and chimeras that have been created or envisioned by scientists, see Andrea L. Bonnicksen, *Chimeras, Hybrids, and Interspecies Research: Politics and Policymaking* (Washington, DC: Georgetown University Press, 2009). For a more extensive discussion of the points raised in this chapter, see Jason T. Eberl and Rebecca A. Ballard, "Metaphysical and Ethical Perspectives on Creating Animal-Human Chimeras," *Journal of Medicine and Philosophy* 34, no. 5 (2009): 470–486.

2. SCID stands for "severe combined immunodeficiency" and "hu" refers to "human."

3. H. Kaneshima et al., "Today's SCID-hu Mouse," *Nature* 348, no. 6301 (1990): 561–562.

4. For discussion of other potential uses of human-animal chimeras, see National Research Council and Institute of Medicine, *Guidelines for Human Embryonic Stem Cell Research* (Washington, DC: National Academies Press, 2005).

5. Suzanne Collins, *Catching Fire* (New York: Scholastic Press, 2009), 91.

6. See Evan Balaban, Marie-Aimee Teillet, and Nicole Le Dourain, "Application of the Quail-Chick Chimera System to the Study of Brain Development and Behavior," *Science* 241, no. 4871 (1988): 1339–1342.

7. For a serious challenge to the current paradigm of how ethical standards are applied to animals, particularly the great apes, in research using chimeras created from such animals, see David DeGrazia, "Human-Animal Chimeras: Human Dignity, Moral Status, and Species Prejudice," *Metaphilosophy* 38, nos. 2–3 (2007): 309–329. For concerns about the overall impact on nature—including human nature—of biotechnological innovation, see Bill McKibben, *Enough: Staying Human in an Engineered Age* (New York: Henry Holt, 2003); and Jeremy Rifkin, *The Biotech Century: Harnessing the Gene and Remaking the World* (New York: Penguin Putnam, 1998).

8. Suzanne Collins, *The Hunger Games* (New York: Scholastic Press, 2008), 331.

9. Ibid., 333.

10. Ibid., 311.

11. Ibid., 334.

12. Leon Kass, "The Wisdom of Repugnance," *New Republic*, June 2, 1997.

13. Aristotle, "On the Soul" and "History of Animals," in *The Complete Works of Aristotle*, ed. Jonathan Barnes (Princeton, NJ: Princeton University Press, 1984), 641–692 and 774–993.

14. There could still be significant differences between the cognitive capacities of human beings and those of other species of animals, even if the latter qualify as rational. Thus only humans would enjoy the full panoply of moral and legal rights, such as the right to participation in a democratic society, but the most fundamental moral rights, such as the right not to be used in research that is likely to harm the subject and is solely for the benefit of others, and the consequent legal protections, would arguably apply to *all* rational animals, human and otherwise.

15. Immanuel Kant (1724–1804), for example, describes human beings as *persons* possessing an "absolute worth" or "dignity" by virtue of their qualities of rationality and autonomy. See his *Groundwork of the Metaphysics of Morals*, ed. Mary Gregor (New York: Cambridge University Press, 1997), 37.

16. To view paintings produced by the gorillas Koko and Michael, see "Koko and Michael's Art—Emotional Representations," *Koko's World*, http://www.koko.org/world/art_emotional.html.

17. Anicius Boëthius, "*Contra Eutychen et Nestorium*" [Against Eutychen and Nestorius], in *Theological Tractates and the Consolation of Philosophy*, trans. H. F. Stewart, E. K. Rand, and S. J. Tester (Cambridge, MA: Harvard University Press, 1918), 85.

18. Thomas Aquinas, "Question 29: The Divine Persons" and "Question 30: The Plurality of Persons in God," in *Summa Theologica*, trans. Fathers of the English Dominican Province (New York: Benziger Brothers, 1948), 1:155–164.

19. John Locke, *An Essay Concerning Human Understanding*, ed. Peter H. Nidditch (New York: Oxford University Press, 1975), 335. For a discussion of how Locke's criterion of personhood relates to the philosophical problem of personal identity, see chapter 13, "Who is Peeta Mellarck?: The Problem of Identity in Panem."

20. See Peter Singer, *Practical Ethics*, 3rd ed. (New York: Cambridge University Press, 2011); and Mary Anne Warren, *Moral Status: Obligations to Persons and Other Living Things* (New York: Oxford University Press, 2000).

21. For the argument that the capacity for a first-person perspective is what makes something a person, see Lynne Rudder Baker, *Persons and Bodies: A Constitution View* (New York: Cambridge University Press, 2000).

22. Henry T. Greely et al., "Thinking about the Human Neuron Mouse," *American Journal of Bioethics* 7, no. 5 (2007): 27–40.

23. See Jason Scott Robert and Francois Baylis, "Crossing Species Boundaries," *American Journal of Bioethics* 3, no. 3 (2003): 1–15.

24. Rick Weiss, "Of Mice, Men and in Between: Scientists Debate Blending of Human, Animal Forms" *Washington Post*, November 20, 2004.

25. See "Extended Interview: Eugene Redmond," http://www.pbs.org/newshour/bb/science/july-dec05/chimeras_redmond-ext.html.

26. Suzanne Collins, *Mockingjay* (New York: Scholastic Press, 2010), 311.

PART FOUR

"PEETA BAKES. I HUNT.": WHAT KATNISS CAN TEACH US ABOUT LOVE, CARING, AND GENDER