

Feature Article: JAF3401

## ON CHIMERAS AND WHAT IT MEANS TO BE HUMAN

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This article first appeared in the CHRISTIAN RESEARCH JOURNAL, volume 40, number 01 (2017). For further information or to subscribe to the CHRISTIAN RESEARCH JOURNAL, go to: <http://www.equip.org/christian-research-journal/>.

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### SYNOPSIS

The National Institutes of Health recently opened the possibility of federal funding for chimera research, the genetic mixing of human and nonhuman animals. An immediate response from both professional pundits and the general public expressed profound discomfort with this idea. The rapidly advancing field of genetics rarely affords the opportunity for deep ethical reflection before another breakthrough splashes the headlines. Too few people seem to grasp that this is a question of funding, and the research will happen regardless of public discomfort. Should federal grants be used to encourage more research in this area? Arguments supporting the measures range from those that beg the question and wrongly assume the ethics have already been settled, to familiar consequentialist and utilitarian appeals to the immeasurable possible goods, and reductionist views of human beings as merely animals with no special nature to protect. The most effective counter is to get past ill-defined charges of playing God and provide a robust understanding of what it means to be human, with serious consideration on the nature of the life we wish to create for the purposes of exploitation. We are the *imago Dei*, set apart by the Creator who made each according to our own kind. Human beings are not the kind of thing that ought to be used for others' benefit. Purposefully creating a subhuman form of life in order to have something as similar to us biologically as is possible without involving moral obligation is an illegitimate endeavor.

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On August 4, 2016, the National Institutes of Health (NIH) announced that it intended to lift a moratorium on combining human and animal genetic material. In the same announcement, NIH opened a feedback period and offered the public a chance to voice any concerns about public money being used in this manner. Some of the headlines that followed in response assured that the NIH would receive plenty of comments. Rod Dreher's piece on The American Conservative website was entitled "Christian-Run Agency Embraces Pig-Man."<sup>1</sup> Wesley J. Smith published his response "Brave New World Should Be an Election Issue" at First Things.<sup>2</sup> The comments posted at the NIH website expressed warnings and fears about scientific arrogance and playing God.

The concern is understandable. Embryo technology, defined by coauthors Robert P. George and Christopher Tollefsen as the abilities of researchers to do things to or with embryos,<sup>3</sup> and genetic engineering advance seemingly daily. We barely have time to process one new genetic novelty before another is making headlines. As the outcry from the announcement opening NIH financing for human animal chimeras still echoed, headlines trumpeting the birth of the first "three parent" child erupted on the scene. Our moral considerations, which require careful reflection, hopelessly lag behind the accelerating capacities of scientists to manipulate human life.

It is clear the idea of part animal and part human embryos sets off alarms in our intuition. It is less clear that those alarms will in any way slow down the progression of embryo technology. As Christians struggle to fit these ever-changing advancements in our worldview, the scientific community rushes ahead at breakneck speed. Whether motivated by consequentialist arguments, a purely reductionist view of humanity, or the simple desire to advance within their profession with no deep reflection about the nature of the life being manipulated, it seems that Wesley Smith is correct; there is little desire or willingness to put meaningful regulations into place.<sup>4</sup> As a professor of neurobiology and anatomy recently told me in a private conversation, "There is no question as to whether or not the experiments will be done. The only question considered by most scientists is whether or not they will be the ones doing the experiments."

Any strategy to understand chimera research and formulate a spiritually informed response requires several steps. We must understand what is being proposed, consider the types of arguments offered supporting this research, and evaluate our own unclear responses against it. Only by cultivating a robust defense of what it means to be a human being can we understand the ethical problems of creating a subhuman life form as a resource and the theological problems of mixing species of different natures on a level that undermines the image of God and diminishes humanity.

## WHAT IS CHIMERA RESEARCH?

The types of chimera research under discussion fall into two categories based on a definition provided in International Society for Stem Cell Research's (ISSCR) Guidelines for Stem Cell Research and Clinical Translation.<sup>5</sup> "Interspecies chimeras are those animals containing extensive and integrated cellular contributions from another species...(a) those formed at the earliest stages of development if there is capacity for widespread chimerism, and (b) those formed later but contributing a significant degree of chimerism to the central nervous system and/or germline."

Put more simply, the first type of interspecies chimera involves introducing pluripotent stem cells (cells that are capable of maturing into any other type of cell) from either human embryos or induced pluripotent stem cells into a nonhuman animal like a pig before the pig embryo reaches the stage where its cells begin to specialize. The pluripotency of human stem cells, their ability to become anything during cell specialization, allows the human genetic material to mix with the animal's material. This produces a nonhuman animal with partially human organs, opening new possibilities in areas such as organ transplants. Researchers can create animals with enough human genetic composition to be maximally useful for both study and tissue donation.

The second type is primarily postcellular specialization. Human genetic material and stem cells are introduced into specific areas of the developing nonhuman embryo, such as the nervous system or reproductive system. An example is introducing human brain cells into mice for the purposes of better understanding and treating numerous types of illnesses and abnormalities. A greater percentage of human brain cells in the mouse's brain structure yields greater benefits from using this chimeric animal as a resource for the advancement of treatment.

### What Is Being Proposed?

The NIH proposes lifting a moratorium on granting federal funds for the purposes of promoting chimera research.<sup>6</sup> Chimera research is not illegal but is currently pursued through private revenue streams or state money. What this proposal changes is the availability of federal funding. The question at hand isn't whether this research should happen at all; indeed, the recent production of a three-parent embryo by a team of scientists that left the United States, where it is a banned procedure, and flew to Mexico, where it is not, demonstrates that such control isn't realistically possible.<sup>7</sup> The question is whether federal money can be directed toward funding chimera research. The federal government has the capacity to grant larger sums of money than privately held

companies and states. These grants don't simply allow current research to progress but encourage scientists to pursue these lines of study. Researchers follow financial incentive.

The funding includes restrictions. The NIH made it clear that nonhuman primate research is off the table. The guidelines require oversight in order to assure that nonhuman animals produced for the purposes of research do not develop beyond control. ISSCR also suggests rigorous establishments of baselines to make it possible to detect immediately any divergence from normal behavior on the part of test subjects.

Attempts to provide safeguards are not new. In her 2008 book, Agneta Sutton shares the guidelines established by one research facility at Stanford University run by professor Irving Weissman. If any chimera mouse injected with human brain cells began to exhibit behavior interpreted as less mouse and more human, then the mouse line in question was to be terminated.<sup>8</sup> This appears to betray a deep moral confusion that will be addressed in more detail below. At this point, at least, the NIH and ISSCR still seem to understand the entire enterprise is fraught with danger.

## **UNDERSTANDING ARGUMENTS IN SUPPORT OF CHIMERA RESEARCH**

If the NIH knows this line of research holds inherent risks, then what is the ethical justification for proceeding? The arguments offered in the previously mentioned ISSCR guidelines beg the question as to the identity of the embryonic human. They don't argue that the embryo is less than a full member of the human family; they merely assert this to be so by defining the embryo as a lesser thing. They offer a hodgepodge of developmental justifications that have been addressed and answered elsewhere without further argument or explanation as to why so-called preimplantation embryos are not a life form we should refrain from exploiting as a resource.

These assumptions come packaged within sincerely expressed desires to provide patients with the most effective treatment possible. Everything sounds reasonably grounded in genuine compassion, but there doesn't seem to be an explanation for why the embryonic human lives being used in this research don't deserve the best from their fellow humans as well. As the previously mentioned professor of neurobiology told me, they operate from the assumption that their view is obviously true to any reasonable person and they needn't bother to argue for it at all.

### **The End Justifies the Means**

Other supporters of this line of research offered comments on the NIH website from purely consequentialist or utilitarian positions. The good produced by this research on

balance with the bad that currently exists in the form of untreatable ailments makes the research itself morally correct. The right or wrong of an action is determined by the outcome. This reasoning goes beyond merely saying chimera research is licit, not forbidden by law, but that the research is the right thing to do.

Therein lies the problem. The so-called properly balanced interest or happiness producing calculations can take an action clear thinking people know is wrong and make it a good action based on the payoff. We conceivably could torture innocent children to uncover a terrorism plot or push an innocent fat man in front of the trolley to save four people tied to the tracks. Ungrounded consequentialism and utilitarianism may force us to argue that torturing children is a moral good, murder isn't murder, and that if creating subhuman life for the purpose of exploiting that life yields enough good, pleasure, or happiness, then that is what we must do. The question of the nature of the life created ultimately won't sway considerations in this view. As George and Tollefsen argue, "It treats the greater good, a mere aggregate of all the interests or pleasures or preferences of individuals, as the good of the supreme worth and value, and demands that nothing stand in the way of its pursuit. The utilitarian thus cannot believe, except as a convenient fiction, in human rights, or in actions that may never be done to people, regardless of the consequences."<sup>9</sup>

Lastly, some NIH commenters claimed that human beings aren't morally special but are merely animals. We shouldn't concern ourselves with whether some research undermines our humanity. The frailties of our biological humanity are exactly what need to be fixed. Substantially longer life spans, full limb regeneration, resistance to disease, and any other new capacities we can introduce to our common existence through the integration of man and technology — whether that technology is mechanical or biological — is a good thing.

### **PROBLEMATIC ARGUMENT AGAINST CHIMERAS**

It is understandable why people feel something deeply unnatural is being done. This explains why the open comments at the NIH on this issue were immediately and overwhelmingly decrying the fact we should not play God with human life. Playing God places us on dangerous ground. We lack divine omniscience and perfect wisdom. We cannot possibly predict how our meddling ultimately will play out for all of creation. This introduces an unacceptable potential for disaster that could be visited on both this generation and all of those that follow. I agree with this in principle.

The problem with this objection is that the concept of playing God is poorly defined. What amounts to playing God? How much are we allowed to tinker? For example, I don't personally know anyone who morally objects to prescription eyewear

or corrective eye surgery. There are still some ethical deliberations over the propriety of organ transplants, but most of these center on the timing of extracting healthy organs rather than on the unnaturalness of the act itself. I've yet to see any of my Christian friends object to videos showing patients with hearing loss having cochlear implants turned on for the first time on the grounds this is playing God by merging the biological and technological in order to cure deafness.

### **Where Is the Line Drawn?**

It isn't even clear that this objection extends into the mixture of animal and human material. Animal heart valves have been used for years as replacements for defective human heart valves. Is this playing God? Human cancers introduced into animal populations in order to advance effective treatment do not elicit cries of playing God from those of us who have watched a family member or friend battle cancer and survive.

Also, there are the cases where we clearly alter the genes of an organism to produce specific human proteins for the treatment of chronic medical conditions. My Type 1 diabetic daughter receives continuous doses of insulin every day. That is possible because scientists genetically altered an *E. coli* bacterium by removing a portion of the protein strand of its DNA and replacing it with a compatible segment of a strand from a human being that turns these bacteria into patented organisms that produce massive amounts of human insulin as they multiply. Similar treatments are produced for other medical conditions. Transgenic animals have been created in order to produce human proteins in their milk that are used to treat blood clotting, cancers, burns, and infertility. Is this playing God? We create and patent new bacterial organisms while modifying more complex animals to serve a therapeutic purpose through the mixture of human and nonhuman genetic material, and I for one am grateful that we do. Gathering the human genetic material doesn't destroy any human life, the animals and organisms remain unquestionably nonhuman by nature, and my daughter gets to continue to live as normal a life as possible with a medical condition that was a death sentence a hundred years ago.

This is precisely the problem with the idea of playing God. A clear definition of what we mean by that doesn't exist, so we risk being guilty of moving the goal posts. Simply claiming it is playing God, as easily as we sense intuitively the wrongness of some of these actions, fails to provide any clear understanding for those we wish to convince.

### **WHAT ARE WE?**

We need to be able to answer the question, “What are we?” Our claim is human beings are the kind of things by nature that ought not to be diminished through genetic mixture with other animals. We are different in kind from all other animals, and this difference commands certain obligations, duties, and even accountability from our fellow human beings. This view theologically comports with our belief in the *imago Dei*, understanding humans are the image bearers of God set apart within creation by the Creator Himself, who made animals distinct and appears to desire they remain so.<sup>10</sup> It makes philosophical sense of our intuitions of natural law that suggest there is a way we ought to be and there are goods we ought to pursue. We have a dignity that is not granted by the Constitution or attributed to us by philosophers but exists pregovernmentally and pre-Constitutionally. This is knowledge open to all on rational reflection.

Contrary to consequentialist/utilitarian considerations that evaluate events by outcomes, this claims the right or wrong of the action is determined by the nature of the agent acting and the nature of the object receiving the action. It also counters the reductionist view of humanity, which sees all organisms as merely biological material and introduces the Kantian idea that human beings, properly understood, are ends and ought never to be treated as means to another’s ends. Nascent human life should not be exploited as a resource to benefit others. Inasmuch as this research encourages the destruction of embryonic humans to benefit others, it is wrong.

### **WHAT ARE THEY?**

These natural human obligations and duties appear to be exactly what chimeric research aims to avoid. We endeavor to create something as close to human as possible to which other human beings have no discernible accountability. This is an illegitimate goal. Researchers pursue the creation of something so much like a human being that it is maximally useful as a material resource, but just subhuman enough that they can do anything they want to it. The entire enterprise is beset with philosophical and ethical confusion.

I mentioned earlier three particular directives that betray the confused reflections surrounding this issue: NIH’s continued restrictions on using nonhuman primates, ISSCR’s strong warning about establishing baselines for animal behavior, and Weissman’s mice rules. Let’s look at the directive to destroy any mice that begin to exhibit nonmouse behaviors as reported by Sutton. The point of this experiment is to maximize human biological brain material and function in mice through genetic mixture. Why would we want to destroy them if this line of research serves a greater good or if there is no meaningful difference between humans and other animals? The

fear appears to be that the new organism in question may understand itself less as an unusually intelligent mouse and more as a diminished human trapped in an animal's body.

### **Human Beings**

This line of thinking requires an understanding of humanity rooted in the theological or natural law definitions of natures offered above. Human beings are different than other animals by nature. There are capacities to which human beings are ordered that are natural to them whether or not they are immediately practicable. If some capacity is frustrated through illness or developmental issues, we understand the absence of that capacity as a privation. We properly sense a loss when someone cannot hear, see, or make full use of the normal human rational capacities. No person that has capacities frustrated is less than fully human, but we understand that restoring hearing to an individual through cochlear implants helps another member of the human family more fully enjoy the human experience.

It may be that we create a subhuman form of life that is perpetually frustrated and incomplete. In the ultimate extension of the moral hubris of this type of project, the moment we realize we have done exactly what we set out to do — create a subhuman form of life very close to us in nature for the purpose of exploitation — we mandate their immediate eradication as punishment for the crime of being too like us. This explains why the research is forbidden on nonhuman primates. They are already too close to us in nature. The risk of the human expression dominating the life form is far too great to leave it to chance.

### **BRAVE NEW WORLD**

This is the danger. We don't understand the nature of the new lives being created. That won't stop us, though. The promises of treatments and cures are too great, and our collective will to make a case for a rigorous understanding of what it means to be a human being appears to be lacking.

The chair of the ethics committee of the ISSCR is Jonathan Kimmelman. His past work indicates that he takes seriously the need to reflect on how the biological sciences are advancing, the need for public input, and even meaningful restrictions. In a 2002 article, he wrote, "Democratic participation in scientific governance would, of course, slow discovery and innovation somewhat. But this seems a small price to pay for replacing technologies that overpower our social and ethical commitments with ones that actually empower them."<sup>11</sup>



We can only hope that, to borrow from Lincoln, we can appeal to the better angels of the genetic scientists' nature. In light of the current climate of *advance first* and *consider ethics after we arrive*, our best strategy in response is to recognize we have never faced a time when a robust understanding of what it means to be a human being had more immediate importance.

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## NOTES

- 1 Rod Dreher, "Christian-Run Agency Embraces Pig Man," *The American Conservative*, August 4, 2016, <http://www.theamericanconservative.com/dreher/christian-run-agency-embraces-pig-man/>.
- 2 Wesley J. Smith, "Brave New World Should Be an Election Issue," *First Things*, August 4, 2016, <https://www.firstthings.com/web-exclusives/2016/08/brave-new-world-should-be-an-election-issue>.
- 3 Robert P. George and Christopher Tollefsen, *Embryo: A Defense of Human Life* (New York: Doubleday, 2008), 7.
- 4 Smith, "Brave New World Should Be an Election Issue."
- 5 International Society for Stem Cell Research, "Guidelines for Stem Cell Research and Clinical Translation," May 2016, 8, <http://www.isscr.org/docs/default-source/guidelines/isscr-guidelines-for-stem-cell-research-and-clinical-translation.pdf?sfvrsn=2>.
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- 7 Nancy Flory, "First Baby Born with Controversial Three Parent Technique," *The Stream*, September 29, 2016, <https://stream.org/first-baby-born-with-controversial-threeparent-technique/>.
- 8 Agneta Sutton, *Christian Bioethics: A Guide for the Perplexed* (London: T and T Clark, 2008), 117.
- 9 George and Tollefsen, *Embryo*, 93–94.
- 10 Genesis 1:25; Leviticus 19:19.
- 11 Jonathan Kimmelman, "The Laboratories of Democracy," *The Nation*, October 10, 2002, <https://www.thenation.com/article/laboratories-democracy/>.