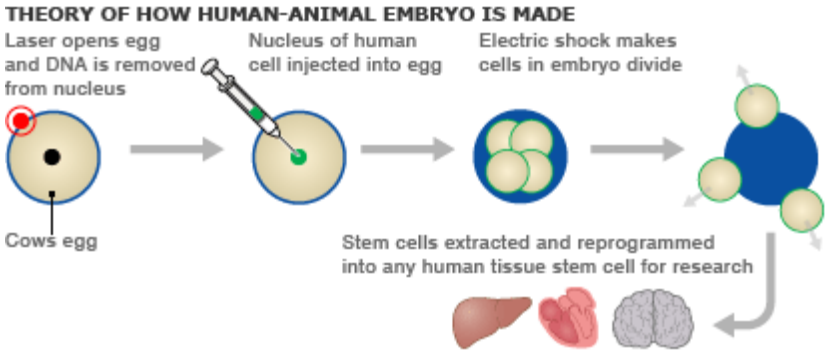
Shayla: What is your view of human/animal hybridization?



Introduction

We have for many years used animal parts to replace worn out, diseased or damaged human parts. We routinely use pig and cow heart valves to replace human valves. However, what is now being done is much more disturbing. Some scientists are merging human cells with animal eggs creating an embryo that is (for now) destroyed within 14 days.

Many people refer to these human/animal hybrids as “chimeras”, a reference to a Grecian mythological beast that had a lion's head, goat's body, and serpent's tail.

These creatures are manufactured in order to harvest stem cells which have the interesting potential of becoming any type of tissue. The argument for allowing this procedure is that the ensuing stem cell research, which may possibly pave the way for “major breakthroughs” in treatments for Alzheimer’s, Parkinson’s and other serious diseases, is so valuable that we should overlook the “ick” factor.

Scientists complain that the present legislation which allows the use of already existing stem cell lines is too restrictive. They say that the human eggs are in short supply and are not always of a sufficiently high quality to meet their needs.

However, the ethical problems raised by this line of thinking are so quirky that most people can hardly wrap their minds around some of the results. For example, it is now possible to genetically engineer mice to produce human sperm and eggs, then through in vitro fertilization, produce a child whose parents are a pair of mice. Though no one is seriously suggesting we do this (at least not yet), the fact that this hypothetical situation lies well within the realms of possibility should cause us at the very least to sit up and take notice.

As William Saletan reports in The Washington Post: “*So far, our mixtures are modest. To make humanized animals really creepy, you'd have to do several things. You'd increase the ratio of human to animal DNA. You'd transplant human cells that spread throughout the body. You'd do it early in embryonic development, so the human cells would shape the animals' architecture, not just blend in. You'd grow the embryos to maturity. And you'd start messing with the brain. We're doing all of these things*.”

What’s going on out there experimentally?

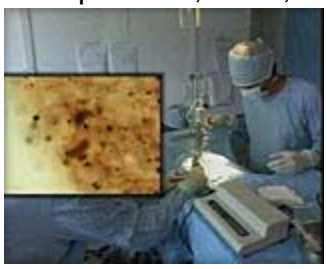
- For years, scientists have added human genes to bacteria and farm animals but again William states: *We've been transplanting baboon hearts, pig valves and other animal parts into people for decades. We've derived stem cells by inserting human genomes into rabbit eggs. We've created mice that have human prostate glands. We've made sheep that have half-human livers. Last week, Britain's Academy of Medical*

Sciences reported that scientists have created "thousands of examples of transgenic animals" carrying human DNA. According to the report, "the introduction of human gene sequences into mouse cells in vitro is a technique now practiced in virtually every biomedical research institution across the world."

- The "OncoMouse," a transgenic mouse exhibiting a human cancer gene, was patented in 1988 by Harvard researchers and is used for cancer research. Scientists have also produced humanized mice with symptoms of Alzheimer's disease.

- In 1995, a University of Massachusetts team of doctors controversially grew a human ear on the back of a mouse then immediately began looking at the possibility of producing a pancreas for diabetics and nerve tissue for stroke victims.
- Biologist Stuart Newman and economist/biotech critic Jeremy Rifkin sought to patent certain chimeras (the “humouse” and the “humanzee”) in 1997, in an effort to curtail their development. Their hope was to gain the patent and then refuse any application to develop those concepts for the twenty years their patent would hold. The patent office has repeatedly rejected their patent application on grounds that the hybrids would be too “human.” The patent office staff said that because the Thirteenth Amendment prohibits slavery, no human being can be owned and thus no human can be patented. The Newman/Rifkin patent application is still pending.

- In 1998, the thumb of factory worker Raul Murcia, 36, which was irreparably crushed in an industrial accident, was grown back using a revolutionary new technique pioneered by doctors at the University of Massachusetts. They were able to grow new thumb bone tissue to the correct size and dimensions using sea coral as a kind of template. The coral has a hollow structure that shapes the bone as it regrows, while slowly dissolving before eventually disappearing entirely.
- In September, 1999, interspecies brain cell injections took place in the U.S. The biotech company GenVec (formerly known as Diacrin) injected fetal pig brain cells into the brain of a stroke patient.



- In 2003, one group injected human adult bone-marrow stem cells into fetal sheep. They found that the cells were distributed throughout the sheep's body and differentiated into human blood, liver, skin,[1] and heart.[2]
- In 2004, the President’s Council on Bioethics published “Reproduction and Responsibility”, in which it advised prohibiting "the production of a hybrid human-animal embryo, by fertilization of human egg by animal sperm or of animal egg by human sperm," or the transferring of a "human embryo into the body of any member of a nonhuman species." The report stated emphatically that "an ex vivo human embryo ... belongs only in a *human uterus*."[3]

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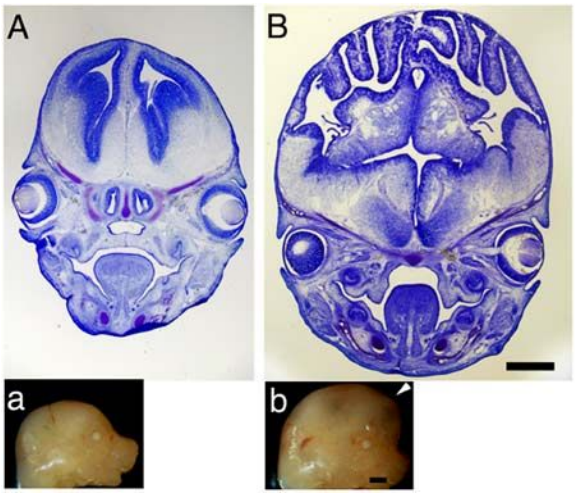
[1] Almeida-Porada and Zanjani, "A Large Animal," 80; and Sylvia Pagan Westphal, "'Humanised' Organs Can be Grown in Animals," NewScientist.com (December 17, 2003)

[2] Judith A. Airey, "Human Mesenchymal Stem Cells Form Purkinje Fibers in Fetal Sheep Heart," Circulation, 109.11 (March 23, 2004): 1401-1407

[3] President's Council on Bioethics, Reproduction and Responsibility: The Regulation of New Biotechnologies, pre-publication version (Washington, D.C.: President's Council on Bioethics, March 2004): 223, 222

- In 2004, two geneticists determined that the injection of human bone marrow cells into fetal sheep brings evidence of incorporation of the human cell lines into all three germinal cell layers of the sheep (endoderm, ectoderm, and mesoderm).[4]
- Another group injected human adult bone-marrow stem cells into fetal pigs and found human cells throughout the pigs' blood. Fused pig-human cell-hybrids were also found in the epithelium.[5] The pig-human hybrids exhibited both human and pig surface markers and contained chromosomal DNA coding for both human and pig genes.
- In 2005, scientists at Harvard University discovered that over-expressing CPG-15 in rats gives them bigger brains and that these enlarged brains have grooves and furrows like evolved mammalian brains with larger surface areas. In another study performed at Harvard, the beta-catenin gene in selected mice was engineered to exhibit increased activity; the mouse brains grew to almost double the usual size. The cerebral cortex, seat of intelligence and language, became more human like.



- It was also discovered that human umbilical-cord blood cells injected into the liver of immunodeficient newborn mice led to development of human immunological cells and lymph nodes.[6]
- The biotech company Advanced Cell Technology inserted human somatic cells into enucleated cow oocytes to produce human stem cells.[7]
- Chinese scientists, at the Shanghai Second Medical University in 2003, successfully fused human cells with rabbit eggs. The embryos were reportedly the first human-animal chimeras successfully created. They were allowed to develop for several days in a laboratory dish before the scientists destroyed the embryos to harvest their stem cells.[8]
- Renegade "researcher" P. Zavos inserted human granulosa cells into enucleated cow oocytes to "practice" his human cloning techniques.[9]
- In England, two teams from Kings College London and Newcastle University have already applied to use hybrid embryos.
- In Minnesota, last year researchers at the Mayo Clinic created pigs with human blood flowing through their bodies.
- At Stanford University in California, an experiment might be done later this year to create mice with human brains. Irv Weissman, director of Stanford University's Institute of Cancer/Stem Cell Biology and Medicine in California, has already created mice with brains that are about

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[4] Graca Almeida-Porada and Esmail D. Zanjani, "A Large Animal Noninjury Model for Study of Human Stem Cell Plasticity," Blood Cells,Molecules, and Diseases 32.1 January-February 2004): 80:
[5] Gaia Vince, "Pig-Human Chimeras Contain Cell Surprise," NewScientist.com (January 13, 2004); Brenda M. Ogle, et al., "Spontaneous Fusion of Cells between Species Yields Transdifferentiation and Retroviral Transfer in Vivo," FASEB Journal (published online January 8, 2004).
[6] Steven Reinberg, "Scientists Create Mice with Human Immune Systems," HealthDay (April 1, 2004); Elisabetta Traggiai, et al., "Development of a Human Adaptive Immune System in Cord Blood Cell-Transplanted Mice," Science 304.5667 (April 2, 2004): 104-107.
[7] Advanced Cell Technology, "Advanced Cell Technology Announces Use of Nuclear Transfer Technology for Successful Generation of Human Embryonic Stem Cells,"press release, November 12, 1998
[8] Ying Chen et al., "Embryonic Stem Cells Generated by Nuclear Transfer of Human Somatic Nuclei into Rabbit Oocytes," Cell Research 13.4 (2003): 251-263.
[9] Andy Coghlan, "First Human Clone Embryo Ready for Implantation," NewScientist.com (September 15,2003),

one percent human. Later this year he may conduct another experiment where the mice have 100 percent human brains. This would be done, he said, by injecting human neurons into the brains of embryonic mice. Before being born, the mice would be killed and dissected to see if the architecture of a human brain had formed. If it did, he'd look for traces of human cognitive behavior. Though ethicists at Stanford at first rejected the proposal, they have since come to approve it, allowing the researchers to produce mice with "some aspects of human consciousness or some human cognitive abilities."

- Roman Catholic Bishops, following their long-held views on conception to their logical end, stated on June 26, 2007 that chimeras should be regarded as human and their mothers should be allowed to not only give birth to them but raise them as their own children if they wished. The bishops said that they did not see why these “interspecies” embryos should be treated any differently than others. The bishops, who believe that life begins at conception, said that they opposed the creation of any embryo solely for research, but they were also anxious to limit the destruction of such life once it had been brought into existence. In their submission to the committee, they said: “At the very least, embryos with a preponderance of human genes should be assumed to be embryonic human beings, and should be treated accordingly. “In particular, it should not be a crime to transfer them, or other human embryos, to the body of the woman providing the ovum, in cases where a human ovum has been used to create them. “Such a woman is the genetic mother, or partial mother, of the embryo; should she have a change of heart and wish to carry her child to term, she should not be prevented from doing so.”

What is going on out there legislatively?

- A bill was recently passed in which British ministers indicated they would allow hybrid embryos which were 99.9% human and 0.1% animal.
- Australia presently allows embryos to be created for research purposes but stops short of allowing human/animal hybrids. The only caveat is when the scientists feel that the procedure is necessary to “test the sperm”.
- Canada and the US ban the creation of human/animal embryos entirely. Canada passed the Assisted Human Reproduction Act, which bans chimeras. Specifically, it prohibits transferring a nonhuman cell into a human embryo and putting human cells into a nonhuman embryo.
- In the US, Germany and Italy federal funds can only be used for research involving “extra” embryos left over from IVF procedures. Austria, Norway and Tunisia do not allow embryo research at all. For the most part other countries have no laws that speak to the debate.

Responsa:

This issue is so scientifically, ethically and theologically complex that many of our objections must at present take the form of questions. We believe that the creation of these chimeras is offensive to the dignity of both humans and animals and that each have the right to exist without being tampered with or crossed with another species. Our objections may be found in the following ten points:

1. Utilitarianism: Scientists repeatedly claim that these pursuits may potentially reveal the secrets to new fields of thought on disease and even possible cures for terrible diseases in the near future. Scientists feel that, the more humanlike the animal, the better research model it makes for testing drugs or possibly growing "spare parts," such as livers, to transplant into humans. Watching how human cells mature and interact in a living creature may, they say, also lead to the discoveries of new medical treatments.

However we must ask, “Is simple utilitarianism a sufficient framework for our ethical decision making process?” Our contention is that some experiments, no matter how medically useful, would be unethical. For instance, would we support

Dr. Mengele's research if we thought that it (as he repeatedly claimed) would produce valuable results?

We must exercise our ingenuity and find other means to develop medicines for our sick. For example we could look into sophisticated computer modeling to discover advantageous lines of thinking without crossing this moral Rubicon.

2. Emotional Response: Most common people who have not been numbed by a constant onslaught of this type of thought experience instinctive revulsion to the concepts. Revulsion may not be a logical argument, but we must consider why we feel such instinctive horror at human/animal hybridization. Even if we do not believe in God but in a purely atheistic evolutionary process, we must consider that every feeling we have has been programmed into us for a reason. Fear is a healthy thing because it keeps us alive in dangerous situations. Hatred can be useful in situations where confrontation is necessary to establish justice or safety. There is a natural reticence to kill a fellow human being that is felt by all but those who are referred to as sociopaths. If the majority of humans are disgusted by this thought line – shouldn't that at least be considered? As Dr. Leon Kass, chairman of the President's Council on Bioethics has said, "*Shallow are the souls that have forgotten how to shudder*."[10]

3. Arbitrary and Plastic Limits: Let's say that research advances sufficiently to increase the "humanness" of these creatures. At what point will we stop? If we say (as British ministers did recently) that 99.9% humanness and 0.1% is all right, why? Why 0.1% and not 0.2%? We need to ask that question now because sooner or later some scientist will. Somewhere someone will seek to have the legislation pushed back to meet the latest "scientific needs".

4. Human Rights - Granting: At what point would a chimera be considered human and what rights, if any, should it have? At what level of "humanness" does the entity become worthy of dignity and human rights? How does one, in fact, measure "humanness"? Is a person less human because, like Dr. Stephen Hawking they are trapped in their bodies? Is a person in a chronic vegetative state more or less human than one in a coma?

These are vital issues that cross over into the question of euthanasia. Japan recently formulated law that would allow a patient to be euthanized even without a written request by the patient or without the family requesting it if a panel of doctors agreed that it was what was "best" for the patient.

At what point does a creature become self-determining? Apparently we are slowly eroding the value of the human existence from both ends of the spectrum. On one end we are making it easier and easier to kill humans while on the other end we are swiftly eroding what it means to be human.

5. Human Rights – Withholding: On the other hand, let's say that we never grant rights or dignity to these creatures. Are we willing to debase ourselves to the point that we are willing to create creatures with human features simply for the purpose of harvesting body parts or in order to create an entirely new form of slavery? This claim is not too farfetched. Already one educator/theologian has written:

"*Chimeras or parahumans might legitimately be fashioned to do dangerous or demeaning jobs. As it is now, low-grade work is shoved off on moronic ... individuals, the victims of uncontrolled reproduction. Should we not "program" such workers thoughtfully instead of accidentally, by means of hybridization?*"[11]

6. Created to die – The fact the scientists assure us that these embryos will never come to term is not a good argument in our opinion. As we believe that our identity is ordained at conception,[12] the destruction of these lives at any stage after conception or their creation for the simple use of "harvesting" is to us morally repugnant.

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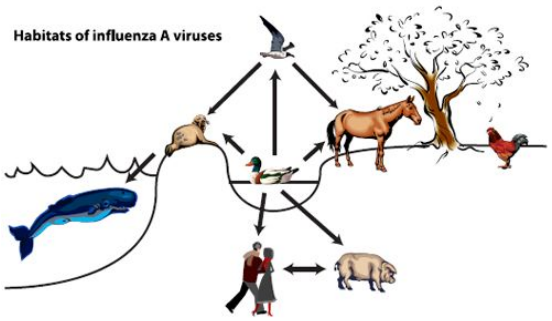
[10] Leon R. Kass, "The Wisdom of Repugnance," in Leon R. Kass and James Q. Wilson, The Ethics of Human Cloning (Washington, D.C.: The AEI Press, 1998): 17-19.

[11] Joseph Fletcher, The Ethics of Genetic Control: Ending Reproductive Roulette (New York: Anchor Press/Doubleday, 1974), 173.

[12] Psalm 139:13-16; Isaiah 44:2; 49:1; Jeremiah 1:5; Luke 1:15

7. Animal suffering - Some concern should certainly be expressed for the experimental animal's suffering. While Christians do believe that they have been given stewardship over animals and are permitted to use them to benefit humanity the key word is stewardship not profligate abuse.[13]

8. Zoonotic transmission - Another concern would be zoonotic transmission of disease, which occurs when pathogens cross the traditional species barriers of disease transmission. When human and animal tissues are intertwined so closely, potential mutations of once species-specific pathogens may gain a unique ability to infect organisms of other species. Consider, if you will, the recent panic over avian flu which crossed that boundary simply by the constant presence of humans and birds in close proximity!



9. Identity: We believe that there is a fundamental difference between replacing a heart valve and impinging upon those processes that uniquely identify us – namely our minds and our reproductive systems. Scientific intervention into the human existence should be limited in its ability to substantially change the identity of the recipient or to genetically modify the next generation who has no say in the matter. Monkey hearts and kidneys have been transplanted into humans many times and we do not challenge the ethics of those procedures because they do not substantially change the identity of the patient.

Apparently, a National Academy of Sciences Committee agrees with this line of thinking. They not only recommended the creation of oversight committees to review research proposals at each laboratory that wants to work with chimeric animals but also recommended that no chimera be allowed to reproduce. Unfortunately their rules are not mandatory and it is up to each lab to decide whether to follow them or not.

Cynthia Cohen, a member of Canada's Stem Cell Oversight Committee, which oversees research protocols to ensure they are in accordance with the new guidelines and the senior research fellow at Georgetown University's Kennedy Institute of Ethics in Washington, D.C. says: "*Creating chimeras by mixing human and animal gametes (sperms and eggs) or transferring reproductive cells, diminishes human dignity. It would deny that there is something distinctive and valuable about human beings that ought to be honored and protected.*"

William Cheshire, associate professor of neurology at the Mayo Clinic's Jacksonville, Florida, branch and a member of Christian Medical and Dental Associations says, *"We must be cautious not to violate the integrity of humanity or of animal life over which we have a stewardship responsibility. Research projects that create human-animal chimeras risk disturbing fragile ecosystems, endanger health, and affront species integrity."*

The natural application of this limitation would thus be to forbid the transplantation of brains or gonads, or the manipulation of these organs so as to substantially change their fundamental nature.

This ban would have to include those genes which carry the ability to change an organism's identity. It would also have to take into account the various stages of life during which animals and humans are more or less susceptible to radical changes i.e. the particularly susceptible and formative embryonic or fetal stage. At this stage most creatures' fundamental architectures are easily changed, and a single foreign cell introduced at this state can end up in very strange (and as yet unpredictable) places.

10. Imago Dei – The Scriptures teach that humanity has been given a unique privilege and status – that of carrying in some mysterious manner within themselves the "image of God."

- Genesis 1:26-27 Then God said, "Let Us make man in Our image, according to Our likeness. They will rule the fish of the sea, the birds of the sky, the animals, all the earth, and the

[13] Deuteronomy 25:4; Psalm 36:6; Proverbs 12:10; 27:23; Jonah 4:11

creatures that crawl on the earth." 27 So God created man in His own image; He created him in the image of God; He created them male and female.

Separation from animals - Man was created independently of the animals and his unique origins came with an increased responsibility of stewardship. God emphasized that separation by bringing all of the animals to Adam so that the human could name them.[14] This not only reinforced Adam's difference but also his separateness since he realized that "no helper was found who was like him." This terminology indicates that the animals were not merely insufficient as labor or companionship but that none could serve as a compatible sexual partner. A female human had to be created and once she was, mankind was "completed". For the purposes of this conversation on genetic propriety, it is important to note that Eve's particular draw was that she was "bone of my bone and flesh of my flesh".[15]

This importance of maintaining unique and distinct genetic lines continued to be highlighted. The Bible tells us that God designed procreation so that plants, animals, and humans always reproduce after their own kind or seed.[16]

Separation from angelic beings - The blending of the "sons of God" and the daughters of men[17] was clearly morally reprehensible.

Laws on bestiality - In view of the fact that these latest proposals seek to cross human and animal eggs and sperm we find it noteworthy that the Old Covenant speaks directly against the sexual convergence of humans and animals.[18] The injunctions were so strong that death was the punishment for transgression. These were perhaps considered necessary in order to keep those who carried the image of God separate from those (the animals) who did not.

Laws on incest - Proscriptions against various forms of incest were also encased in Halakah.[19] These likely kept the Israelites genetically healthy, because inbreeding can lead to increased congenital abnormalities and certain genetically linked diseases in the population. Again the need to keep the genetic lines clear and healthy was considered so important that it required national laws.

Conclusion

Therefore, we believe that significantly changing the identity of an organism via combining human and nonhuman cellular or genetic material (especially at the embryonic or fetal level) could be construed as a violation of the dignity of the human person. In fact, we would go so far as to say that God not only abhors the unspeakable act of sexual relations between animals and humans, but also the combining of their genetic constitutions at a certain level.

The Ransomed hold then that species integrity is defined by God, rather than by arbitrary or merely evolutionary forces. The fusion of animal-human genomes runs counter to the sacredness of human life and man created in the image of God. Any effort to violate species integrity - no matter how noble the intentions - must be considered carefully with these principles in mind.

The new biological genomic revolution highlights the power the human species now has to redesign various species and biological life. We must not allow such an ability to outstrip the ethical analysis that responsible minds agree must accompany it.

[14] Genesis 2:19
[15] Genesis 2:23
[16] Genesis 1:11-12, 21
[17] Genesis 6:1-6
[18] Exodus 22:18; Deuteronomy 27:21; Leviticus 18:23; 20:15-16
[19] Deuteronomy 27:22; Leviticus 18: 6-14; 20:17, 19-21