When Pigs Fly?

in

- **Genetically Engineered Animals** [1]

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When Pigs Fly?

Legal and Ethical Issues in Transgenics and the Creation of Chimeras

The Walter C. Randall Biomedical Ethics Lecture

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The following is a speech delivered by Linda MacDonald Glenn for the Walter C. Randall Lecture Award in Biomedical Ethics at Experimental Biology, 2003 in San Diego, CA.

Thank you for inviting me to speak today. It is quite an honor to be among a distinguished group of colleagues who recognize the importance of balancing progress for humanity with advances in technology. Although I did not have the honor of meeting Walter C. Randall, from what I've learned of the man, he was a thoughtful, considerate man, who promoted integrity in the sciences and advocated education and interaction with the public sector.

When I've introduced myself to those attending the conference and some of the exhibitors, I've received a curious reaction to my affiliation with the American Medical Association's Institute for Ethics. My comments here today are not necessarily a reflection of AMA policy and I'm not a member of the "ethics police". My intent is to inform, help identify the issues, raise questions and advocate for a cautious, thoughtful approach.

The last few years have seen scientific advancements that we thought to be possible only in the realm of science fiction. From nuclear transfer to exogenous pregnancies, implantable brain chips to transgenic engineering, cyborg to chimera, we are forging the next step in our own evolution. Future developments will likely challenge our concepts of what it means to be "human". Currently, human beings cannot be patented, but the definition "human being", has yet to be defined by the courts or the legislature. Arguments as to what constitutes "personhood", are being closely scrutinized and debated in the fields of religion, ethics, psychology, and law. (For the purposes of this talk, I will sometimes use humans and persons interchangeably, because, as I discuss later, the law often defines "persons" without any reference to or distinction from "human".) Possible implications range from affecting the abortion debate to end-of-life decision making to animal rights. The next several decades will test the flexibility of the law in response to evolving advancements. Because our technical prowess often exceeds our ethical analysis, I offer some ideas how our new creations may fit within the context of historical ethical and legal analysis.

Part 1: Current Developments in Transgenics and Chimeras

A. Plant Nonhuman Animal Human Interface(s).

In Greek mythology, the chimera was part lion, part goat, part dragon, which was slain by the hero Bellerophon. In modern day biology, a chimera is a genetically engineered creature created from the DNA of different species. What once was fiction has now become fact; through the process known as DNA recombinant research, scientists are able to splice genes together from different species that would never be able to mate under normal, non-laboratory circumstances. A review of some of the last few years announcements illustrate the amplitude of the advances: Plant Nonhuman Animal Human Interface(s) "DNA of human and nonhuman animal tumor fragments inserted into tobacco DNA, harvested, potential vaccine for lymphoma extracted (See [http://www.grain.org/publications/dec001-en-p.htm](http://www.grain.org/publications/dec001-en-p.htm))

Nonhuman Animal Nonhuman Animal Interface "Spidergoats". A Canadian biotech company has spliced the genes of a spider responsible for spinning spiderwebs (one of the strongest fibers known...
to mankind) into the genome of a goat. When the goat's milk is processed, the result is BioSteel®
, a substance that can be spun into a thread that has the tensile strength and flexibility of a super
spiderweb. The potential applications range from medical applications to space exploration. For all
the hype about potential benefits, the potential abuses are equally frightening. The expression
"when pigs fly". is apropos on a variety of levels. I could have called my presentation "Spidergoats"
the "When Pigs Fly". was a much catchier title and the phrase has captured the imagination of
numerous artists on the internet, as you can see from images captured from the World Wide Web
when I did an image search on Googleâ“¢. While the thought and images of pigs flying is one that is
bemusing, the underlying issue "that of crossing species boundaries and the creations of new life
forms is serious business, not to be taken lightly.
Human Nonhuman Animal Interface(s) "Scientists at the University of Missouri announce a possible
breakthrough in xenotransplantation; they have created genetically engineered pigs whose organs
lack a gene that triggers rejection by the human immune system (6). In April 1998, biologist Stuart
Newman and biotech critic Jeremy Rifkin applied for a patent for a "humanzee" part human and part
chimpanzee, in a calculated move designed to re-ignite debate about the morality of patenting life
forms and engineering human beings (4).
The US Patent and Trademark Office (hereinafter, PTO) denied the patent, acknowledging that,
although it has permitted the extensive patenting of biotech-engineered life forms and human DNA,
the 13th Amendment of the US Constitution forbids the ownership, and they considered this
application to be too close to the patenting of human beings. Since the United States Supreme Court,
Congress or Patent Office have never defined what a human being is, the debate still continues
about whether or not the PTO as an executive arm of the United States government has the power to
define "human being".
The International Olympic Committee has concerns that athletes will soon employ genetic
engineering to run faster, jump higher, and throw further. Lawyer bioethicist George Annas suggests
that we need to set up an international criminal tribunal that will ban genetic engineering and
xenotransplantation, as well as other forms of possible alterations of humans for fear of endangering
the species or creation of a slave race. The headlines and fears of potential abuses raise the
question of just how many genes does one need to be considered "human".
Further advances in the blending of nonhuman animal and human DNA could result, intentionally or
not, in chimeric entities possessing degrees of intelligence or sentience never before seen in
nonhuman animals. Would an intelligent, sentient creation be property or a person? Could he/she/it
be patented? Patents on animal and other life forms are allowed in the United States and likely soon
in Canada. European and Asian patent legislation includes prohibitions on inventions whose
commercialization would "offend society's fundamental and shared moral standards" and could
arguably exclude certain higher life forms.
Part 2: Some Historical Perspectives on Humanity and Personhood
Traditional western philosophy has assumed that humanity is a necessary precondition to
personhood. However, as I will discuss soon, the law has evolved in a manner that doesn't require
humanity for "personhood".
Humans have held a special place in the "Great Chain of Being". The Great Chain of Being has come
under attack for a variety of reasons: first, it reflects a traditional hierarchical Judeo-Christian view
that man was "given dominion over the Earth and all of its inhabitants". Secondly, it reflects the
Kantian secular notion of rational man as reigning. While philosopher Immanuel Kant contributed to
the notions of human dignity and the worth of the individual, his philosophy and writings were
inspired largely by Socrates and Plato, who maintained that only rational men had immortal souls.
Kant is silent about the dignity and worth of the senile, demented, or disabled. Thirdly, the Great
Chain of Being reflects a time when the Earth was viewed as the Center of the Universe, pre-Galileo
and Copernicus.
An alternative view, the Circle of Interdependence reflects a non-hierarchical interdependent
relationship between man and the Earth and also of its inhabitants; it is a view that is more
consistent with, Native American, Buddhist and chthonic belief system. While it is more holistic,
interdependent, approach, it needs to be balanced against notions of human dignity and individual
worth.
Professor of Oncology Van Rensselaer Potter coined the term "bioethics", in 1970. In his landmark
work, Perspectives in Biology and Medicine, his thoughts on this term were as follows:
"We are in great need of a land ethic, an environmental ethic, an international ethic, and so onâ€
Mankind is urgently in need of new wisdom that will provide the knowledge of how to use knowledge'
for man's survival and for improvement in the quality of life. This concept of wisdom as a guide for
action the knowledge of how to use knowledge for the social good - might be called the science of survival,' surely the prerequisite to improvement in the quality of lifeâ€¦A science of survival must be more than science alone, and I therefore propose the term bioethics' in order to emphasize the two most important ingredients in achieving the new wisdom that is so desperately needed: biological knowledge and human valuesâ€¦Man's survival may depend on ethics based on biological knowledge and, hence, bioethics".

But back to the question of what does it mean to be "human"? What of a biological definition that relies on species definition? A scientist could argue that distinguishing traits between species are manifestations of the genetic material of each species. However, the definition of species is a hotly debated and contentious issue among scientists, producing reams of publications. Darwin argued that "species" are not "real" entities in nature. The huge varieties of definitions (morphological, typological, etcâ€¦) reflect changing theory, and the different purposes to which the species are used by individuals. Even if we could agree that the biological species concept would be the accepted definition of species, species grade into one another in time as they evolve one into another. How do we decide where Homo erectus has evolved into Homo sapiens? The uncomfortable truth is that species differentiation is not as clear-cut as some would like it to be.

Joseph Fletcher, Episcopalian theologian and bioethicist, argued for a list of fifteen "positive propositions" of personhood. These attributes are:

* minimum intelligence
* self-awareness
* self-control
* a sense of time
* a sense of futurity
* a sense of the past
* the capability of relating to others
* concern for others
* communication
* control of existence
* curiosity
* change and changeability
* balance of rationality and feeling
This extensive list suggests that most individuals, at one time or another, are not persons (3). Fletcher's comments that a severely retarded Down's syndrome child was not a person and his proposal that chimeras and cyborgs be created to do man's distasteful or dangerous work (1), led to severe criticism from his peers and the public. These beings, Joseph Fletcher called "parahumans". whom he hoped would "be fashioned to do dangerous and demeaning jobs". In other words, Fletcher advocated the creation of a slave race of mostly "humans designed by us and for our use. The excessive stress on rationality and intelligence is arbitrary and degrading to those who are mentally retarded and senile. However, Fletcher's list of traits may be useful if personhood were a continuum, rather than as a definitive, fixed state, a model that has been proposed philosophically, but not yet applied in legal theory or practice.

Part 3: The Legal Implications
The United States Supreme Court provides a spectrum of persons: including the "natural". "illegitimate children, minors, aliens, as well as "juridical" such as corporations, labor unions, nursing homes, municipalities, and government units. Currently, "natural". persons are biological beings, limited only to humans, although "human". is not defined legislatively or statutorily. Historically, nonhuman animals have been considered mere "property"; however, it is important to note that slaves, women, and children were regarded a mere chattel until the mid-to-late 1800's and early 1900's. Yet, nonhuman entities, such as corporations and ships have been recognized and given rights as "persons".

If historical notions of personhood prevail, we run the risk of denying essential basic liberties to intelligent, sentient beings. We need to be prepared to ask, "How can we preserve our human rights and dignity despite the fact that our humanness' may no longer be the exclusive possession of Homo Sapiens?'".

The ever-so-gradual trend in the law is to grant living, sentient beings greater moral recognition and legal status. At least three states have had their highest court recognize that companion animals have a moral and legal status superior to that of inanimate objects. Several states have legislation pending to recognize the same; other court cases evidencing this trend involve dead body cases (such as the freezing of baseball legend Ted Williams' body, or what I like to call the Jerry-Springer-meets-bioethics case) and frozen embryos. If certain transgenic creatures were worthy of moral status and respect, where would these rights come from? Some examples would be from the courts, legislatures, and proclamations. For example, United Nations Resolution A-RES-37-7, the World Charter for Nature, declares: Every form of life is unique, warranting respect regardless of its worth to man, and, to accord other organisms such recognition, man must be guided by a moral code of actionâ€(5). The resolution is a plea that lifeforms, other than those falling within the traditional concepts of human, are worthy of moral status. It also establishes a common scale of value that both human and nonhuman life have intrinsic worth.

As I mentioned earlier, some bioethicists have proposed an international criminal tribunal to monitor genetic manipulation, and that the insertion of any human gene into any other species be banned, but considering that the US and Canada do not prohibit the patenting and marketing of DNA sequences or cell lines, this is unrealistic. Some legislation has been proposed that would define "human being". as any entity possessing higher faculties (such as the ability to reason or formulate speech in oral or written fashion) or any creature born of human ovum and sperm (whether or not the genetic material was scientifically altered), but such legislation has been rejected as overly broad.

Part 4: Conclusions
The Property "continuum "Personhood will continue to evolve. At one end of the spectrum, you will see pure property, such as inanimate objects, land, and those things that cannot suffer. As one approaches the center of the continuum you would have basic rights, which would consist of primarily negative liberties, such as the right to be free from torture, the right to be free of restrictive physical confinement or imprisonment, and right to maintain bodily integrity. At the other end of the spectrum, you have the Kantian ideal of the fully autonomous rational individual, with the attending
full course of negative and positive rights, such as the right to vote and the right of self-determination as well as the responsibilities that attend those rights. As "co-creators" like parents, the courts are finding we have attendant responsibilities as moral agents. As different forms of intelligent transgenic creatures are created, the courts will be determining where these creations fall on the continuum of personhood. Legislators, policymakers and governmental bodies will ponder the question and submit statutes. The Great Chain of Being will yield to alternative "Pyramid of Being" which is more reflective of stewardship, ecological awareness and an interdependent approach. Until then, we can expect intense cross-disciplinary debate and discussion as new intelligent life is created through science and medicine and recognized legally, morally, and ethically (2). Thank you for your attention.

References
3. Indeed, when presenting this list at several conferences, a number of participants implied that they knew more than a few people in their workplace and classrooms who might not meet all of these criteria at any given time.

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