

DEFINING THE HUMAN SPECIES: AN EXAMINATION OF TRANSGENIC APES IN HALACHA

Leora Perlow

Scientists today are capable of inserting human DNA into species of the “great apes,” granting them human characteristics. The transgenic product of such an experiment raises many moral and *halachic* (of Jewish law) issues. If enough human DNA is added to an ape, at what point does it become a biological human? To fully answer this question, we must first look at how our species, the *Homo sapiens* or *ben enosh* (son of man), is defined by the Torah. This article will examine what it is that makes us human despite our genetic similarity to apes and to transgenic ape-humans, how such species are viewed by *halacha*, and lastly, the biblical prohibition of *keilayim* (crossbred species).

The question of what makes humans unique has occupied the minds of philosophers, both Jewish and Gentile, since the beginning of time. Are we really that biologically different from the great apes? Recent studies show that genetically, the difference between humans and the great apes (which include chimpanzees, orangutans, and gorillas) is minimal. The approximate genetic similarity between chimpanzees and humans is 98.5% [1]. Scientists (but not *halachic* thinkers) claim that as little as five million years ago, a single creature was the common ancestor of humans, chimpanzees, and bonobos. Writes Lee Silver in his book *Challenging Nature*, “nonhuman organisms evolved gradually through a fuzzy evolutionary stage of partial humanness before slowly morphing into the species we call *Homo sapiens*” [2]. Some, like the authors of *The Great Ape Project* believe that this statistic should impact society profoundly: “we have now sufficient information about the capacities of chimpanzees, gorillas, and orangutans to make it clear that *the moral boundary we draw between us and them is indefensible*. Hence the time is ripe for extending *full moral equality* to members of other species, and the case for doing so is overwhelming” [3]. However, most humans are not quite ready to welcome chimpanzees to their homes as guests or to grant orangutans voting rights for the upcoming elections.

According to Jewish tradition, the weighty biological title of human can be placed on an individual only if and when three necessary conditions are met. The first stipulation is that the individual in question must be human-born or formed within a human;

the second is that the individual must possess moral intelligence (to be discussed in further detail below); and the third is that the individual must be capable of producing offspring with another human [4]. Only one of these three conditions is necessary to be considered a human by *halacha* [4].

The earliest sources stating that humans must be formed within or born from a human are those in the *Tanach*, *Midrash*, and Talmud which refer to man as “*yelud isha*” [5], literally “one who is born from a woman.” The *Chacham Tzvi* was first to derive from the language of the Talmud (*Sanhedrin* 57b) that any being formed within a woman is human and that killing such an individual would constitute murder. This view is supported by Rabbi Eleazar Fiekes and later the *Hazon Ish* in his writing that an aberrant fetus that was miscarried is similar to a human in regard to the laws of burial and mourning [4]. Thus a human is any individual who has the characteristic of being formed within or born from a human.

What if a chimera were made of human and ape DNA? How much “human” DNA would have to be added to make a chimpanzee biologically one of us?

The second condition that defines the human race according to *halacha* is more complicated than that described above; it is the trait of *da’at* or moral intelligence. Rashi [6] (supported by *Targum Unkulus* and Rambam) wrote that humans are unique because of their ability to differentiate between good and evil, a trait not found within the animal kingdom. This is why the Seven Noahide Laws (the set of laws given to Noah as moral imperatives) were given to all of mankind. Rashi did not include IQ, intellect, or the ability to learn in his definition. Rather, he looked solely upon the trait of *sechel*, moral intelligence. Maimonides [7] and Rabbi Akiva (as quoted by *Bereishit Rabba*) included free will in their definitions of *da’at* [8]. Another possible aspect of *da’at* is that it includes speech. The ability to express oneself in as wide a vocabulary as

our own may be a distinguishing human feature [6].

The third method of gaining admission to the human race is the ability to produce human offspring with a fellow human. The Talmud in *Sanhedrin* 58a assumes that only humans can successfully reproduce with other humans. Thus, if a human offspring is born of two parents, then both parents are, by definition, human as well.

Interestingly, non-*halachic* thinkers agree with two of the three qualities to define what classifies an organism as a human being. Silver addressed the first human feature: “[t]he one biological attribute that every reader of this book shares in addition to a human brain, is biologically human parents” [2]. This claim that all humans have *Homo sapiens* parents agrees with the first *halachic* definition of humans, that humans must be formed within or born from another human.

Silver also agreed with the second definition of humans: “The ability (or potential) to speak and use symbolic language is commonly considered human-defining.” Speech is one of the manifestations of *da’at*, the second human-defining quality. This argument is supported by Josie Appleton who claimed that humans evolved because of “a refinement in the vocal tract, allowing a greater range of sounds for speech.” Appleton also described a moral aspect of this definition: “Humans are the measure of all things: morality starts with us” [9]. Both Silver and Appleton’s explanations fall into place with different aspects of *da’at*, the second human-defining characteristic.

As to the third defining trait of humans, no scientific publication today claims that progeny of a human must be human, because this may simply not be true. Explained Silver, “Chimps and humans are so similar to each other chromosomally that most scientists believe hybrids formed between the two probably could develop and be born alive” [2]. The assumption in the Talmud *Sanhedrin* 58a that an offspring of a cross between humans and apes would not be viable is not taken at face value by Silver.

All of this bantering about what makes us human was purely theoretical for the entire history of mankind - that is, up until only a few years ago when genetic engineering accelerated into realms we never even knew existed. The first chimera (an organism which is composed of both human and animal genetic material) was an immunodeficient mouse in which human stem cells were inserted, allowing it to develop the immune system that it initially lacked.

What if a chimera were made of human and ape DNA? How much “human” DNA would have to be added to make a chimpanzee biologically one of us? Would it make a difference which

human parts were formed? Let us return to the *halachic* qualifications of a human.

As to the first *halachic* human characteristic, the transgenic ape would not be human-born or formed. The animal would be born an ape, albeit it may contain some inserted human DNA or even a human organ. (Parenthetically, it is because a chimera could never be human-born that it also could never be born Jewish. Regardless of the amount of human genetic material that is added to an animal, if an organism is not born to a Jewish human mother, it cannot be Jewish.)

Would a human-ape transgenic creation achieve *da’at*, the second defining trait of humans? If human brain cells were inserted into an ape, this could be possible. Such research has scientific merit, as it would teach us about Alzheimer’s, Huntington’s, or brain cancer, yet it may also unintentionally give apes that spark of moral intelligence that distinguishes animals from humans. Singer portrayed an experiment in which the cerebral cortex (the part of the brain that solves problems and thinks abstractly) was increased in a chimpanzee so that it would be of a size equivalent to that of the human cerebral cortex. To accomplish this, researchers would simply increase the amount of neurons in the chimpanzee embryo. Such experiments could lessen the cranial difference between humans and the great apes [3]. (It should be noted that from a *halachic* perspective, an intelligent ape remains an ape; the *nesbama* is unique to humans).

Finally, the third condition: would a transgenic ape-human be able to produce human offspring with a human? “It soon may be possible to transplant human stem cells into animal fetuses to alter their sex organs and provide them with the capacity to generate human sperm and eggs,” stated Dr. John Loike and Rabbi Dr. Moshe Tendler [10]. Thus, if human genetic material was added to an embryo of a chimpanzee, the resultant organism could potentially have human gonads, enabling it to successfully mate with another human and produce human offspring. As bizarre as this may sound, such a chimera would be biologically human.

Inserting human genetic material into a member of the great ape species appears at face value to be a clear violation of the biblical prohibition of crossbreeding. The Torah commands, “You shall not let your cattle gender with a diverse kind; you shall not sow your field with mingled seed; neither shall a garment mingled of linen and woolen come upon you” [11].

Dr. Loike and Rabbi Dr. Tendler stated that, for two reasons, genetic engineering does not fall under the prohibition of crossbreeding. Firstly, the chimera’s body is a “mosaic composition of cells.” *Each cell has DNA of only one of the parent species.* The

biblical prohibition of crossbreeding refers to creating an animal with the DNA of *both* parents in *each* of its cells. Secondly, the Bible's motive for prohibiting crossbreeding may be inapplicable to transgenic species, since the prohibition exists primarily because offspring from such a union are sterile. Human-ape chimeras, however, may not be infertile, as explained above, thus deeming their creation permissible [10].

The very recognition of the plethora of moral questions that arise and the attempt to derive answers from ancient texts proves us to be a moral and thus human species.

In her book Brave New Judaism, Dr. Miriam Wahrman wrote about “brave new animals,” or at least transgenic ones, in relation to the prohibition of *kilayim*. She cited the *Hazon Ish's* claim that although sexual contact is forbidden between different species of animals, artificial insemination is permitted to produce a hybrid species [12]. According to this ruling, it seems that chimeras are permissible. Rav Shlomo Zalman Auerbach, a leading *halachic* authority in Israel today, also did not consider genetic engineering to fall under the prohibition of *kilayim* [12].

A commentary on the Mishna [13] explained that, “The well-known maxim applies, a minority becomes annulled in a majority, or a major disannuls a minor quantity, or the lesser is canceled by the larger.” Since in a human-ape chimera, the majority of DNA is ape DNA and the minority is human DNA, it can be inferred that the human DNA would be “annulled” or overridden since it is the minority.

Rabbi Jekutiel Judah Greenwald believed that an “engrafted or transplanted cornea becomes nullified on the recipient” [14]. He based this ruling on the Talmud that stated: “If he grafted a young shoot on an old stem, the young shoot is annulled by the old stem. The law of *orlah* (the prohibition of benefiting from a tree in the first three years after it was planted) does not apply. The young shoot does not retain its status; it acquires the status of the old tree” [15]. According to this view, any human DNA inserted in a member of the great ape species would be lost in the recipient, rendering the chimera an ape.

To summarize, various explanations for chimeras not violating the prohibition of crossbreeding include: (1) each individual cell in the chimera is only from one parental type, (2) chimeras are

not necessarily sterile, (3) sexual contact between two different species need not occur, (4) genetic engineering is not considered *kilayim*, (5) a minority of genetic material is annulled in a majority (thus *halachically* rendering the chimera a pure species), and (6) the donor material becomes part of the recipient.

Despite the sources that incline *halachic* authorities to dub transgenic species acceptable, the issue of *kevod habriyot* (human sanctity) cannot be overlooked. This sanctity results from the Divine origin of our creation. Judaism considers humans to be created in the “image of God.” Dr. Loike and Rabbi Dr. Tendler best defined this as: “humans beings are created as a unique species with certain obligations to partner with God in the preservation and improvement of the world.” Judaism believes that God gave us dominion of the planet for us to benefit. This includes technological advances, which are permitted as long as they are used for the improvement of the world. We need not fear playing God; rather we need to fear “playing human inappropriately” [10].

According to Dr. Loike and Rabbi Dr. Tendler, “if reconstituting human brain cells in animal fetuses were to impart human-like intelligence, self awareness, and personality to the human-monkey chimera, then it would be a denigration . . . a major affront to human dignity and the sanctity of human beings” [10]. Humans were created in the image of God. To take the wisdom that God granted to our species alone and to implant it in other species is an insult to our Creator.

Interestingly, the National Academy of Sciences (NAS) agreed. In 2005, it published the “Guidelines for Human Embryonic Stem Cell Research,” in which the NAS dubbed research in which human embryonic stem cells were inserted into nonhuman primate embryos as “a threat to *human dignity*” and forbade any such creations [16]. Such scientists, thereby agreeing with philosophers of Jewish thought, have recognized the value of *kevod habriyot*.

Our world is one in which the once-sharp distinction between humans and animals grows blurrier with each new scientific discovery. Heaping genetic evidence that humans are closely related to the great apes and revolutionary strides taken in genetic engineering cause many to worry that “[t]hough well equipped, we know not who we are or where we are going . . . Engineering the engineer as well as the engine, we race our train we know not where” [17]. Recent technological discoveries enable production of ape-human chimeras, a hybrid that raises many questions in *halacha*, as a topic of its own and in the realm of *kilayim*.

The very recognition of the plethora of moral questions that arise and the attempt to derive answers from ancient texts proves

us to be a moral and thus human species. Once transgenic apes begin to recognize this dilemma and similarly derive conclusions, the biologically barrier between our two species will no longer exist, for it is precisely this morality that defines a human. ■

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude toward Dr. Babich for providing the sources for this essay. His enthusiasm for Torah U'Madda motivated me to develop the ideas found within this work. Additionally, I would like to thank Rabbi Eliezer Lerner of Michlelet Mevaseret Yerushalayim for his review of the Torah content. Finally, I wish to express my appreciation for my parents' constant support and encouragement.

REFERENCES

- [1] Science Daily. Comparing Chimp, Human DNA. www.sciencedaily.com/releases/2006/10/06013104633.htm (retrieved September 2, 2010)
- [2] Silver, L. M. (2006). *Challenging Nature: the Clash of Science and Spirituality at the New Frontiers of Life*. New York, NY: Ecco. pp. 83-187
- [3] Cavalieri, P. and Singer, P. (1993). Preface. In *The Great Ape Project: Equality beyond Humanity*. London.
- [4] Loike, J. and Tendler, M., (2004). Ma Adam Va-teda-ehu: Halakhic criteria for defining human beings. *Tradition*. 37:1-19.
- [5] Job 14:1; 15:14; 25:4; Yoma 75b; Nidda 13a; Devarim Rabba 35:2; Tanhuma Mishpatim 19; Pekkudei 3
- [6] Genesis 3:22
- [7] Maimonides, Hilkhos Teshuva 5:1
- [8] Bereishit Rabba 12:5
- [9] Appleton, J. (2007). Animals Are Not Equal to Humans. In *Animal Experimentation: Opposing Viewpoints*. Farmington Hills, MI: Thomson Gale. pp 44-53.
- [10] Loike, J. and Tendler, M. (2008). Reconstituting a human brain in animals: A Jewish perspective on human sanctity. *Kennedy Inst. Ethics J.* 18:347-367.
- [11] Leviticus 19:19
- [12] Wahrman, M. Z. (2002). *Brave New Judaism: When Science and Scripture Collide*. Hanover and London: Brandeis University Press.
- [13] Blackman, P. ed. *The Mishnah. Footnote on Kilayim 9:1 Mishnayoth Vol I: Order Zerayim*. (Gatehead, England. Judaica Press 1964)
- [14] Rosner, F. (1979). Organ transplant in Jewish Law. In *Jewish Bioethics*, Rosner, F. and Bleich, J.D (ed). Hebrew Publishing Company, New York, NY. pp 358-379.
- [15] Talmud Sotah 43b
- [16] NAS. National Academy of Sciences (2005). *Guidelines for Human Embryonic Stem Cell Research*. Washington, DC: National Academy of Sciences.
- [17] Gerdes, L. I. (2004). *Genetic Engineering: Opposing Viewpoints*. Farmington Hills, MI: Greenhaven.