


Debating the need for genetic engineering of humans—there's 'nothing special' about our DNA

 ne day in early spring, I received a unique email. Would I accept an invitation from Oxford University's student debate society, the Oxford Union, to participate in a debate on human genetic engineering? I was to argue in opposition to the proposition: "This House Believes that Genetic Engineering Undermines the Nature of Humanity." I accepted this invitation, and prepared to engage in this important scholastic tradition with all the gravity fitting of such an occasion; the opportunity for thought leadership in the field of genetic modification, for which I have been a science communicator for over five years. I felt like I've been preparing my whole life for this moment.

Founded in 1823, the Oxford Union is the largest society at the University of Oxford and one of the most famous student societies in the world. In the past they have hosted Presidents Reagan, Nixon and Carter to the Dali Lama, Albert Einstein and many other political dignitaries and men and women of the arts, sciences, and letters. The student members are the beneficiaries of knowledge that these esteemed guests can bestow from their professional experience, in a way that cannot be taught or learned in a classroom.

The night of the debate, the students, mainly "PPE" (philosophy, politics and economics) majors, were jocular but well-prepared in their speeches. These students will go on to form the future body politic of Great Britain and perhaps elsewhere throughout the world. Even though the atmosphere was light, almost one of play, the work we were doing there was very serious. Policy-makers the world over typically do not have a background in medical sciences, genetics, or medical ethics but they are tasked with making the policy that governs these concerns. Often, science moves more quickly than policy and it is up to the scientific societies to display a modicum of self-governance, as with the voluntary, worldwide moratorium first on transgenic organisms, then later on human cloning.

In Great Britain right now several reproductive technology initiatives are being sorted for example, "[three person](#)" IVF, the [IVF postcode lottery](#), [reductions in IVF](#) cycles, and the length of time [eggs should be kept in cryostorage](#) for fertility preservation for young healthy women. Current laws allow for gene editing in [human embryos with CRISPR/Cas9](#) for research purposes, but clinical uses are prohibited. There are other controversial aspects of infertility treatment in the UK, for example, children [conceived with donor eggs and sperm have the right to know their genetic heritage when they turn 18, causing a shortage of tissue donors](#). [Gender selection \(of embryos\) is also prohibited](#).

No doubt the Union selected our group as much for our entertainment value but for their own education purposes as well. My fellow debate participants are esteemed in their respective professions: [Joyce Harper](#), Professor of Human Genetics and Embryology at the Institute for Women's Health, University College London is one of the world experts in preimplantation genetic diagnostics; [Kathryn Lasky](#), an author with dozens of children and adult books to her credit; [Donna L. Dickenson, a philosopher who specializes in medical ethics who also has published over twenty books, guiding our ideas on ownership of the body, medical and bioethics, particularly in maternal-fetal and women's health](#).

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Lastly, [Rodolphe Barrangou](#), one of the scientists credited with discovering CRISPR/Cas9. Barrangou and his collaborators' discovery that bacteria have adaptive immune systems have provided the mechanism by which manipulation of the CRISPR-Cas9 pathway can be used for genome engineering. He is now the Editor in Chief of the [CRISPR Journal](#), and found out just days before the debate that he has been inducted into the [National Academy of Sciences](#).

During the reception just prior to the dinner I spoke with many students who were in favor of the House proposition. I knew we would need to educate and argue passionately in order to make their feet walk through the "Nay" door. Each side argued well, and the full speeches will be found on YouTube in the near future.

My arguments for the Opposition centered on a few simple ideas: there is nothing special or unique about human DNA. We share 98% of our DNA with chimpanzees, and over 50% with chickens, fruit flies, and bananas... some regions of our genomes are ultra conserved and not a single letter is different from primitive bacteria. All of us alive today share one unbroken genetic lineage with our single cell ancestors from billions of years ago.

There is no specific immutable property to human DNA. Our DNA mutates in response to the sun, our environment, from the simple act of replication itself during cell division. If you have ever had a cold, the flu, chickenpox- than your genome has been modified by the viral syringe that injected its DNA into your cells to be replicated. If you have ever been pregnant, undoubtedly the signature of the DNA of the child you carried can now be found throughout your body, even in your brain. A static, unchanging genome is not part of human nature.

Additionally, complex human traits are not defined by our genes, or the arrangement of our nucleotides, and I even argued that genetic engineering should not be limited, for example to curing a defined set of diseases that some council deems morally worthy of curing. But that it could be applied without reproach even to frivolous causes. Is there any reason to infringe the freedom of consenting adults to do what they want with their own genome?

The arguments for the Proposition (against genetic engineering of humans) mainly focused on the worries inherent in commoditizing genes and people, consent and the use of the technology potentially for harm. All of these worries are the true for genetic engineering, any technology really. Would a child still be loved if parents paid for a trait that did not manifest fully in the child as it was expressed and developed in a particular environment? Embryos cannot consent to these medical procedures. Would this deepen inequality among people, perhaps even enough to create a new subspecies of human? Previously, I made ten other arguments in favor of human genetic engineering in [Who's Afraid of Human Genetic Engineering with CRISPR/Cas9, where I addressed many of these questions](#).

In the end, students chose to walk through the "Nay" door by a margin of 2:1 and I felt confident that the

Union's bright, young class of 2018 had received not just a night of entertainment, but a theoretical and philosophical underpinning in human genome editing from the scientists, professors, philosophers and men and women of letters that they welcomed into their House.

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