

THE BOUNDARIES OF ETHICS

Relevant for: Science & Technology | Topic: Biotechnology, Genetics & Health related developments

In this Oct. 10, 2018, photo, scientist He Jiankui speaks during an interview in Shenzhen in southern China's Guangdong province. China's government on Thursday, Nov. 29, 2018, ordered a halt to work by a medical team that claimed to have helped make the world's first gene-edited babies. | Photo Credit: [AP](#)

In November, Chinese researcher He Jiankui set off a storm when he claimed that he had created the world's first babies, a pair of twin girls, genetically edited with CRISPR-cas9. He said that the twins had genes now that protected them from HIV. Ideally this should have been a laudable scientific advancement. But Mr. He has been condemned, not only by peers in China but by geneticists, biotechnologists and ethicists worldwide.

Mr. He broke the scientific and regulatory protocol by not vetting his experiments, which involved embryos and hopeful parents, by his organisation's ethics committees. He also expounded on his work to non-scientists before submitting his work for peer-review. These are enough grounds to invalidate any medico-scientific investigation, however novel and groundbreaking. Yet the greater consternation is that an ethical red line has been transgressed.

The current international consensus is that editing 'germ line' (or reproductive) cells of healthy humans is unethical and should only be used as a last resort as it could mean introducing unknown and potentially harmful changes in subsequent generations and even entire populations. While the principle of 'do no harm' pervades scientific practice, particularly in light of the early 20th century's European and American experiments with eugenics, it shouldn't be forgotten that ethical norms in science aren't framed in a higher moral plane. What is permissible and ethical is also influenced by business interests, concerns among countries that they might lose a competitive advantage, and how medical advances have actually progressed.

It might seem that the Space Wars of the 1960s between the U.S. and the Soviet Union hark back to a bygone era, but the U.S. has on many occasions expressed concerns about China shrinking its scientific dominance. The National Science Foundation's Science and Engineering Indicators 2018 report says, "The U.S. still leads by many S&T measures, but our lead is decreasing in certain areas that are important to our country ... from gene editing to artificial intelligence ... and it's critical that we stay at the forefront of science to mitigate those risks." When China announced its first CRISPR-led human trial in 2016, *Nature* quoted cancer immunotherapy expert Carl June as saying, "I think this is going to trigger 'Sputnik 2.0', a biomedical duel on progress between China and the United States." Private companies in both countries have spent billions on the prospects of gene-editing. Thus where cash is already riding on a technology that's still many years away, those who develop tools towards realising these goals can often justify their ventures, however ethically problematic they may be.

Harvard geneticist George Church is on a project to resurrect a version of the extinct woolly mammoth. The purported reason for 'de-extinctifying' this animal is that the Asian elephant is endangered and susceptible to a herpes virus. Therefore, having a new closely related species, sans the virus, could mean saving it. There's also a global warming kicker. The new species would live in the Siberian permafrost and punch holes in the snow and prevent tundra permafrost from melting and releasing greenhouse gases. While Professor Church agrees that these are speculative ideas, it would be naïve to assume that his work is of interest only to elephant conservationists. Every single step towards recreating the mammoth will inform understanding on how to safely and effectively alter cells to delete harmful genes and eventually

promote 'healthy ones' in humans.

Before Robert Edwards and Patrick Steptoe were awarded the 2010 Nobel Prize for pioneering the technique of In Vitro Fertilisation (IVF), they were accused of meddling with nature, and no further public funding for their research was allowed.

The New York Times reported that a 'three-parent baby' (incorporating DNA from three people) was first created in the U.S. in the 1990s and no permissions were granted by the authorities for this. The doctors were denied public funding but there was no worldwide condemnation and no compelling reason other than infertility in some patients and educated guesses that motivated the doctors.

The history of IVF shows that there was no demonstrable case made for the necessity of test-tube babies and neither were there years of evidence from, say, primate studies for scientists to conclude that IVF babies would be as healthy or no more at risk from infections than naturally conceived babies. The evidence for its suitability and safety only emerged over time. Assuming that Mr. He's done what he claims, he deserves to be rapped but not condemned or vilified. He's broken a red light, not crossed a rubicon.

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The government's maternity benefit programme must be implemented better and comply with the Food Security Act

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