**Life as we know it?**

*Michael J. Reiss, member of the Nuffield Council on Bioethics, Professor of Science Education at UCL and a Priest in the Church of England, reflects on research that aims to develop the tools needed to synthesise a human genome.*

The news that [Wellcome is providing £10 million to a research collaboration to try to synthesise a human chromosome](https://wellcome.org/news/new-project-pioneer-principles-human-genome-synthesis) from scratch has excited some and alarmed others. To some, it offers hope that we will better understand how human chromosomes work and that new therapies will result. To others, it raises fears of unintended consequences.

The Synthetic Human Genome Project intends to develop the tools and methods that one day will allow scientists to synthesise an entire genome (the complete genetic component of an organism – whether a bacterium, a plant or a human). For now, the aim is more modest but still pretty revolutionary: to start from simple inorganic chemicals and build an entire human chromosome. Most of us have 46 chromosomes so, in principle, once you can make one, you are well on the way to making the others.

The work is not just about human chromosomes – it may help, for example, to produce new crop varieties better able to withstand changing climates. But, unsurprisingly, it’s the human element that has captured the headlines.

For some commentators, this is all a bit Frankenstein like. In Mary Shelley’s 1818 Gothic novel, Victor Frankenstein is a young scientist who succeeds in creating a human-like creature from human body parts. (Spoiler alert – it doesn’t end well.) Synthetic biology, including the Synthetic Human Genome Project, aims to go further by starting not with existing body parts but with ordinary chemicals.

Encouragingly, the project has learnt the lessons of the widespread rejection in Europe of genetic engineering. Ethics and public engagement are central to its running. Wellcome ha2 stated that the project will “work with academic, civil society, industry and policy partners around the world to examine the ethical, legal and social implications”. Furthermore, the project will be undertaking case studies across Europe, Asia-Pacific, Africa, and the Americas, which should help avoid the Western-centric focus that has been typical of many projects in genetics.

What do I think the outcomes will be? For a start, it is likely that the science will work. While gene therapy has taken longer to become a clinical reality than many would have thought, we now know enough for the scientific goals of this project to probably be attainable.

Then, it is likely that there will be fewer ethical objections than there were in the 1980s and 1990s when genetic engineering was getting going. This is partly because the project is more sensitive to ethical issues than were some research projects back then. But, perhaps more importantly, the narrative will be more carefully curated, and the context has changed. Early examples of the genetic engineering of plants included antibiotic-resistant tobacco and the proposal that Christmas trees could be engineered to glow in the dark. Not the sorts of examples to convince sceptics or enthuse the general public. With the Synthetic Human Genome Project, we will be told about its tangible benefits, including the potential to improve human health.

Furthermore, we are now more used to life science technologies becoming routinised in ways that were unimaginable just a generation or two ago. [In 2023, 3.1% of children born in the UK resulted from IVF](https://www.bbc.co.uk/news/articles/c3en42pwdwyo) (*in vitro* fertilisation); that’s an average of one child in every primary school classroom. Gene therapy is beginning successfully to tackle an increasing number of diseases and inherited conditions. Many people’s in principle objections to changing human genes (‘it’s unnatural’ or ‘we don’t know what the consequences might be’) dissipate when someone who suffers excruciatingly painful sickle-cell attacks is successfully treated or when someone who is blind is now able to see. It’s not quite “the blind see, the lame walk, those with leprosy are cured, the deaf hear, the dead are raised to life, and the Good News is being preached to the poor” (Matthew 11:5) but for some with a religious faith, it’s a sign of a fallen world receiving healing.

On the other hand, it would not surprise me if a non-insignificant minority of people rejected such new technologies. Off-grid living is increasing, and the rejection of new technologies need not be Luddite. It can be inspired by environmentalism and an increasing fear of autocratic governments and the power of new tech.

We shall see.