BIO-PUNK

Stories from the Far Side of Research

Edited by
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For Natalie

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This collection is entirely a work of fiction. The characters and incidents portrayed in it are entirely the work of the authors' imagination, although some stories are based loosely on certain documented events. The opinions of the authors, scientists and historians are not those of the publisher.

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'It had got out. A pillock on their research team took some home 'in total security' to show his swotty son under his microscope how it was self-replicating. And without permission, the kid nicked out to school with it to show off the artificial life his dad made at work... They've had to close down the school.'

'It's that dangerous?'

Rick shrugged. 'You wouldn't know the knock-on effects until it was too late.'

'But you stopped it?'

When he laughs he's like a mischievous boy. 'You really want the details?'

The details were fascinating and led us, quite naturally, from the mystery of self-replicating life to the marvellous intricacies of more sophisticated forms of reproduction. Next time I go into formal hall I shall be able to tell Charlie a thing or two about phospholipid bilayers. And to look upon the Chinese boy with perfect equanimity.

Afterword:

Green Gremlins

Dr Ainsley Newson
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WHAT FIRST ENTICED me about synthetic biology – that is, the application of engineering principles to the design and construction of new biological components or organisms – was the vastness of the field; the possibilities for new understandings of biology and inter-disciplinary collaboration. The opportunities for scientific creativity using the combined techniques of biology, engineering, chemistry, physics and computer science (among others) are seemingly endless, as are the possible real-world applications. There are huge potential rewards for those researchers in synthetic biology who display open-mindedness, are open to new scientific partnerships and are adept at creative thinking. But synthetic biology is not without implications.

It is this seeming step into unchartered territory that gives rise to a role for people like me – academics who work in 'bio-ethics', a discipline that applies ethical reasoning, social science research, legal scholarship and policy-making to moral problems in bio-science and health care. With the significant potential of synthetic biology also come interesting ethical questions, which although perhaps not fundamentally new (we've travelled similar paths before with nanotechnology and genetic engineering) are vital to address for this research to be acceptable to society.

In reflecting on Jane's witty and illuminating story together with the research that inspired it, what jumps out to me, as an ethicist? The work described in the piece, 'Menter's' Green Gremlin bacterial cells, seems to have been inspired by work at the J. Craig Venter Institute that was published in

2010. JCVI scientists created what was termed the first self-replicating synthetic bacterial cell. This was not a fully 'synthetic' cell in that it was a modified replication of a real-world bacterium. The host cell wasn't synthesised in the lab but adapted from an existing bacterium. It also wasn't, obviously, made of plastic or any other unnatural material. But they did put it together from scratch in that they first artificially synthesised all the parts of the genome they would need, as opposed to the cutting and pasting approach of genetic engineering. It also shows that functional genomes can be made (synthesised) in the laboratory and then put into an empty host cell to continue replicating. This same team is now working to make a 'minimal cell', an artificial organism that will contain only those genes needed to sustain simple life – nothing else.

The central character in Jane's story asks: 'Who on Earth *wants* them to create synthetic life?' Well funding bodies, for one, and governments. They have ring-fenced significant research funds for this type of work and the more basic science that supports it. And surveys and other conversations with the lay public have also shown broad support and enthusiasm for synthetic biology.

The drive to create synthetic life might better be understood if we see where it could lead us, which is to new, better and cheaper pharmaceuticals, new medical diagnostic tools and treatments, new ways of cleaning up the environment (bio-remediation or toxin detection) and new, cleaner, greener fuels. In addition to these applications, synthetic biology research is also expected to help us to understand more about the fundamentals of biological life; how it works and what can go wrong and when. The systematic approach of synthetic biology will help to unlock some of the secrets of biology that have hitherto remained elusive. In an increasingly application-driven research culture, the value of this intrinsic knowledge should not be underestimated.

It's also important to point out that we are not talking

here about Frankenstein-style artificial sentient entities. Synthetic biology could lead to the creation of an entity not previously found in nature that is capable of sustaining and replicating itself, but this will be a micro-organism. And while synthetic biology does lead to interesting discussions about what it is to be 'alive' and what, if any, moral obligations we may owe to the entities that are created through this research, in the short to medium term we are not talking about creating new, complex creatures. So just as we use anti-bacterial sprays to control germs around our homes, so too will we treat early synthetic entities. If synthetic biology does one day lead to more complex entities, once they do arise we can look to the moral capacities they might have. We would then consider the question: what is it about a life that is valuable and ought to be respected? If a new life-form had certain capacities, for example sentience or the ability to feel pain, then this may give rise to certain moral obligations towards it.

Does this mean that researchers in synthetic biology are 'Playing God'? And if they are, does this matter morally? It is true that creating a new form of life (if this is ever achieved) is about the farthest from 'natural' that you can get. However, this is what decades of scientific research, particularly research in health, have been all about: trying to overcome the inherent problems that nature lumbers us with. Objections about 'Playing God' seem to assume that Nature, or the corresponding God-like entity, gets it right all the time, which of course it doesn't. Nature is neither harmonious nor stable. But we do need to be careful and cautious about what we create.

Is there money to be made in synthetic biology? Certainly. And there are already patents, which concerns many (including me). There is, thankfully, a ground-up attitude among many synthetic biology researchers to ensure that the benefits of this research are accessible to many rather than few. The main way this is being achieved is by using a collaborative, 'open source' approach to

research, to try and innovate ahead of those who only have commercial gain as their aim.

But what of the green gremlins? Will we need Rick to save 'mankind from extinction'? Synthetic biology, like any form of biological research, cannot be entirely without risk. And for this reason, attention to the bio-safety and bio-security aspects of synthetic biology has been a focal point since the field first emerged. In a European context, it is currently considered that existing rules and regulations more than adequately cover synthetic biology risks. Yes, there is still a risk of a rogue scientist synthesising smallpox in his garage, but such problems are not unique to synthetic biology. Moreover, although there are concerns over the creation of novel life-forms, if we simply cease to do any activity because it carries a risk, then we would not only deny ourselves the benefits of synthetic biology, we would stymie the whole field from developing. What this precautionary approach is saying is that we should keep things as they are, just because we can't trust ourselves to keep doing the right thing in the future. Taking this reasoning to its logical conclusion would mean we would never be able to do very much at all. And, as Rick points out in Jane's story, lab conditions can also be put in place to control the green gremlins, namely by starving them of energy.

Synthetic biology and the entities that researchers create from it may well change how we understand life, but it will not reduce how special we think it is. Rather, I hope that it will inspire greater awe for life's complexity.

An Industrial Evolution

Adam Marek

'I AM JOSTLING for position, trying to find a view in the gaps between elbows and bodies. I cannot miss it. This moment. Ellie gasps and grunts and groans. One of the surgeons shifts, and then… there it is. Pulled from her roughly, it seems to me, its orange fur dark and slicked down against its tiny frame. The world has just become a different place. Another genie is out of the bottle.'

Caspar Stak, *Black Window*, June 2024 Issue.

Even though the road from Kapas to Perjan Tungul is now so smooth that the bus glides with barely a bump, ten minutes into our journey a man in the back row gets travel sick and lays a Duty Free carrier bag on the floor to cover it. I spend the next four hours with a t-shirt tied round my face, my headphones in, and my eyes closed.

I arrive just after three in the afternoon, and am surprised to see here a big café with parasols, cushions on the chairs, waiters in white shirts, a fountain, and a bar made entirely from glass with an enormous fruit and flower arrangement in the centre. This is not the Sumatra I remember.

To step out of the bus, I must break through a wall of heat. It seems to roar in my ears. Eleanor has arrived on an earlier bus, and is sitting on her suitcase in the shade of a palm tree. Three young boys crowd her knees. All four are talking and laughing.

It has been 20 years since I saw her, and even though she has aged considerably during her exile in Canada, she is instantly recognisable: the conspiratorial hunch and sideways