

Transformism: novel forms and new materialities

There is an excitement around Synthetic Biology, with its aspiration to make endless new forms infinitely possible. Synthetic biology sets out to create new life to understand what already is, and develop the capacity to re-programme it to create forms and functions that cannot be found in nature, and to improve what can be. With an engineering approach to biology, it extends our taxonomies of the animate and inanimate, of the sentient and the inorganic and folds them in new ways. It dreams up complex systems such as gourds that can be programmed to grow into fully-fledged houses, windows that create energy as they let in light through photosynthesis, drains that convert waste into energy, trees that can form useful structures such as bridges or towers, bio-robots that seek out pests such as flies, snails and rats to convert their bodies into sustainable bio-electricity, new foods that have a subtractive calorific content, bacterial coatings that transform pollutants and CO2 into armorial masques healing concrete cracks, bio-sensors that glow, or change colour with the contamination of undesirable presences. It wants materials to be smart, responsive, full of switches, choices, thoughtfulness – it can think itself evolutionary *and* revolutionary.

With this giddy wish-list of future applications so generates an ever-expanding glossary to articulate its actions and desires, along with a host of new nouns to describe its agents. Like its very methods of re-modelling existing living parts to do new work, it appropriates terms and language to accommodate its new modus. For instance, for when things get too complex, when the minutiae of detail too long to recall - it creates *abstractions* and *abstraction hierarchies*. These are 'black boxed' ideas, units, or substrates: blocks of pre-calculated acted upon matter that can perform a specific function. They don't need explanation or extrapolation, just ready implementation, like a circuit or section of code. They can be synthetically replicated and used as building blocks of known functionality. Though synthetic biology applies an enlightenment engineering logic and pragmatism to its methodology and its terminology, it is suffused with the musings pursued in folktale and mythology: to make giant, fecund, to shapeshift, and transform. It premises itself on empirical systems and standardized parts, and incants the language of engineering, electronics and programming code to living systems. However, when the narrative is articulated in terms of its aspirations and applications, the story chimes with the realm of the magical, of the sacred, the mythical.

Many of its storylines are recited by those who read from a trajectory of an evolutionary technology, from the written word the printing press to a synthetically programmed future. They take the speaking position of what Donna Haraway names the *modest witness*, the

legitimate and authorized ventriloquist for the object world, adding nothing from his mere opinions, from his biasing embodiment... He bears witness: he is objective; he guarantees the clarity and purity of objects. His subjectivity is his objectivity. His narratives have a magical power — they lose all trace of their history as stories, as products of partisan projects, as contestable representations, or as constructed documents in their potent capacity to define the facts. The narratives become clear mirrors, fully magical mirrors, without once appealing to the transcendental or the magical.

Donna J. Haraway, *Modest_Witness@Second_Millennium. The Haraway Reader*, Routledge

The visionaries of synthetic biology fear that intellectual progress could be hampered by uninformed objection, and that public resistance is essentially an irrational response to the progression of thought by those haunted by ghoulishness, unable to cope with the potential of taxonomical reconfiguration. However if we switch genre of the storytelling from evolutionary timeline to science fiction, we can see that as with capitalism itself, there is a façade of immovable rationality and logic, that it is in fact suffused with myth, dreaming and fantasy. We have of course always used tools and technologies to transcend and extend our own physical and imaginative boundaries, and incantations of expansion and transcendence can lead us to

different narrative outcomes. We all use stories to understand science – even though scientists may not always acknowledge that they are engaged in an act of storytelling. Can synthetic biology trigger a discourse that recognises *mythopoesis* - the power of stories to create as well as describe reality? Will these new 'superfolds' of mindfulness and matter, of the human, and non-human – the organic and inorganic offer radical new formulations of subjectivity, new modes of being? Could Haraway's own cyborgs find space to configure within this new science? Might it instead simply invite capitalism and militarism to extend its grasp to the life of the cell and beyond, instrumentalising commodified and alienated subjectivities at the scale of the infinitesimal?

Synthetic biology shares an imperative with nanotechnology, they are close disciplines projected to converge. They take raw material – whether they be genes or atoms - and manipulate them at the nanoscale (a billionth of a metre), to project their behaviours outwards into manifold new dimensions.

In the nanoworld, nature can be harnessed anew as a force of production. The self-organising abilities of DNA are mobilised in nanomachines. All that frenetic activity of bacterial self-replication, molecular self-assembly and self-organisation, biological stimulus and response systems and viral architecture rebadges nanoscale and mesoscopic elements - enzymes, nucleic acids, ribosomes, chloroplasts, mitochondrions, flagella and the like - as a new working class, grafting away inside living cells, constructing, reconstructing, destroying, clearing, cleaning, sweeping, accelerating, bending, twisting, rotating, operating, shooting, combining.

From *The Urpflanze (Part 2)* Melanie Jackson and Esther Leslie, 2013

Though much of the work of synthetic biology takes place in the realm of the digital, modeling, calculating, projecting outwards – the 'wet' work remains visceral and embodied in ritual and methodical physical process. Much work in synthetic biology requires a 'chassis' – a substrate on which gene transfer, synthesis and replication can take place. This is often e-coli – profuse in the gut and one of the most populous bacteria on earth – and in the popular imagination, a deadly infection. To create new organisms with re-scripted ATCG genetic data, strands of DNA are combined with e-coli – by processes of heat shocking, centrifuge, streaking, incubation, scraping, electrification, inoculation with anti-biotic, feeding with broth, cloning, amplification, ligation and transformation.* This harbouring of work, embodied states, making use of entropy and of replication takes us to the very core of where the narrative arcs might project into the future. There is an opening here of the boundaries through and between objects, signs, bodies, nonhuman and human events, thoughtfulness and matter, production, exchange, entropy. These new entanglements are however of human initiative, they will be developed within political economies, and the spectres of salvation and extinction hover around them.

One of leading arguments for us to fully embrace synthetic biology with light touch regulation and a well funded future is its potential to ameliorate industrial over-production. We aspire to do this by coercion of nature at the nanoscale, by directing its own tendency to produce, replicate and self assemble, in tasks that compensate for our own disastrously flawed relation to work and production. We intend to set it to work to detect and deliver targeted drugs to cancers, (many themselves caused by industrial excess), re-balance atmospheres, grow plants that can thrive in exhausted soils, tackle obesity and eating disorders, malnutrition, create new forms of energy, turn base matter and waste into new forces of production. It is the voice that is the most dominant, along with the whispered incantation of the new term *the genetic economy*. This narrative does not necessitate us to rethink the nature of the productivism that is causing crisis, but applies a (patentable) intelligence to localized problems. It could promise a new relationship with objects, with entropy and corporeality, production and excess - but it does not require us to reconsider our relationship with obsolescence. It could extend the trajectory of generating novel forms to support current patterns of consumption.

Though synthetic biology is born out of symbiosis of the material and the theoretical and it opens up new ways of thinking dynamically about these relations, for others the shrinking of scale offers a potential dissolution of the biological and material altogether. Some avatars of technological singularity embrace the idea that technology will soon bring about a greater-than-human intelligence, and a greater than human chassis for this intelligence. Like Plato's realm of pure forms that disavows hair and dirt, the body itself could be jettisoned for a purer, more ethereal substrate. There is a sense that biology and entropy interrupt rather than catalyse the ecstasy of consciousness, a divine submission to disembodiment of thought:

If we radically upgrade our bodies with biotech, we might find that in addition to augmenting our biological capabilities, we're also going to be replacing more of our biology with non-biological components, so that things are backed up and decentralized and not subject to entropy. More and more of the data processing that makes up our consciousness is going to be non-biological, and eventually we might be able to discard biology altogether, because we'll have finally invented a computational substrate that supports the human mind. At that point, if we're doing computing at the nano scale, or the femto scale, which is even smaller, you could see extraordinary things... What if we could store all of the computing capacity of the world's computer networks in something that operates at the femto scale? What if we could have thinking, dreaming, conscious minds operating at the femto scale? That would be a substrate independent mind. You can even go beyond that. [John Smart](#) has this really interesting idea he calls the **Transcension Hypothesis**. It's this idea that that all civilizations hit a technological singularity, after which they stop expanding outwards, and instead become subject to STEM compression that pushes them inward into denser and denser computational states until eventually we disappear out of the visible universe, and we enter into a black-hole-like condition.

Jason Silva *A Timothy Leary for the Viral Video Age*, Ross Andersen, *The Atlantic*, APR 12 2012

In late February of 1692, The Reverend Samuel Parris called a doctor to come to the aid of his daughter, Betty, and to his eleven-year-old niece, Abigail both of whom were suffering from spontaneous fits. Tituba, a slave in the household was blamed for introducing the girls to witchcraft, and subsequently her story too has been subject to metamorphosis. It has changed form and significance across time, religious, ethical and political value systems. Her ethnicity has been described variously including Arawak Indian, Indian, half-Indian, Black African, Caribbean, half Caribbean, half White. Though her confession in the written court record is to an entirely European notion of witchcraft she is connected in posthumously published historical accounts to telling voodoo stories, practicing voodoo rites, sparking hysteria and a spate of further trials. She has been attributed with various forms of magical agency from shapeshifting to sorcery, fortune telling to divination. She has been a concubine, a wife, a singleton, a mother, a victim of physical violence, executed, accused and exonerated. She disappeared from the historical record, to reappear in countless subsequent fictive and analytical re-formulations. In Sneha Solinki's work *Supernatural* it is not the artist or the scientist that is identified with witchcraft or magical transformation, but the organism they have synthesized together. Tituba is given agency as a biological physical entity, classified, categorized - and, just like her historical counterpart, utterly prone to further acts of metamorphosis.

Morphology is linked to Morpheus, the God of dreams, who shapes and reshapes himself and our worlds of reverie. Morpheus sends human forms into dreams. His brother Phobetos made the plants dream. The third son of Hypnos, named Phantasos, made the stones and other inanimate objects dream- and the dream elements over which he presided were the most unreal, tricky, fantastical. Dreams can adopt any form, any shape. Dreams are infinite forms.

Morphology is the imagination of infinite variety. Morpheus sleeps in a dark cave lined with poppies. Does dream dream itself? Does matter

form itself? Proteus the sea god also had the ability to foretell the future. He adopted different shapes in order to avoid revealing what was to come. He would only divine for those who could capture him...

From *The Urpflanze (Part 2)* Melanie Jackson and Esther Leslie, 2013

* Super-natural, Sneha Solanki, 2012

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any sufficiently advanced technology is indistinguishable from magic.
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