Liquid Life
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Author’s Note

I am fascinated by the way creatures work and live together. My earliest recollections are in the back yard, with a series of empty jam jars, collecting all kinds of creepy-crawlies and observing how they responded to change — whether a helpful handful of soil, or a thimble of water could help them live peacefully together with adversaries, like spiders and wasps. These naive experiments failed spectacularly and each evening, my mother would sigh deeply, as she emptied out my drowned worlds over the fence.

As I grew, my curiosity for life’s character never left me. Since synthetic biology, which proposes to design and engineer with nature, was not on the curriculum at university, I studied medicine instead. During a sabbatical in India, I worked in a leprosy colony with a hand surgeon who performed tendon transfers that would restore movement to important muscles by sacrificing the function of not so important ones. Through the rehabilitation process, I saw how someone’s quality of living could be transformed through simple modifications. This exceeded their anatomical reconfiguration and extended to their social and environmental reintegration, so people once excluded from a community through their illness, could now live joyfully, bring in an income and raise a family.

I began to see how our accounts of the living world shaped our relationship with it. Modern science has contributed to many positive narratives that direct our cultural discourses, values and practices, but at the same time, it has also led to unhelpful truisms. While I had read Richard Dawkins under the table in biology lessons at school, by the time I was working on hospital wards, the whole notion of biological determinism that underpinned the idea of the ‘selfish gene’ was deeply problematic. It endorsed the idea of social inequality as a biological ‘fitness’, which trapped people in cycles of poor health and despair. Repositioning actors differently within established
hierarchies of order — such as replacing men with women, or one race with another, and vice versa — was also not enough to bring about real change, as these inversions simply reasserted the same kinds of inequality they proposed to address through a different set of actors. To empower alternative futures, different technical platforms and alternative ways of interpreting findings are needed, so we can find ways of thriving together and defeat the incredible odds against our survival at the start of the Sixth Great Extinction.

Searching for testable narratives to underpin new stories of life, I wanted to find an experimental field that was very poorly inhabited by the humanities and awkwardly articulated by the sciences. The prebiotic context of lifelike events presented an ideal opportunity, as they operate without the cultural and historical tropes that frame biological narratives, where lifelike chemical assemblages made from programmable* materials such as droplets, clays, crystals and nucleotides, can perform in ways that are not already framed by expectations of species, gender, function, form or aesthetics.

In 2008, I began to work with dynamic droplets in an origin of life context. The droplets, or protocells, were model systems for early cells that did not possess any DNA. Exhibiting strikingly lifelike features, such as being able to move around their environment and interact with each other, they also provided a platform through which a theory and practice of protolife based in material phenomena, could be developed and tested. However, the conceptual framing of these models of early non-biological life were already framed by the logic and atomistic construction principles of machines. For example, dynamic oil droplets were conceived as ‘soft robots’, which meant that all outcomes were interpreted according to a mechanistic worldview, referring to the agency of chemical assemblages as actuators, their material

* In this sense, ‘programmable’ infers a degree of agency and decision-making acting within the material system, which is typical of natural computing.
expressions as manufacturing processes and their organisational abilities as (computer) programs (PACE Report 2008).

Liquid life started as a provocation and approach towards an alternative view of life than the bête machine. Originally it took the form of a ‘cytoplasmic manifesto’ (Gyimah 2009), which opposed notions of genetic determination by looking to the ‘fluid’ character of the body of a cell, by shifting the perspective on cellular control from gene to metabolism (De Lorenzo 2015). This is achieved by thinking through, and with, the characteristics of liquids, as well as bodies that are capable of flowing such as gases, amorphous solids and creatures. ‘Liquid’ also indicates more than a phase state, or an incompressible fluid that takes up the shape of its container, and references a metaphorical and technological platform that draws on the potentiality of dynamic, nonlinear systems. The ongoing extension of this research is centred on the Living Architecture project, which draws on the principles of liquid life to investigate a possible framework for approaching the construction of lifelike systems beyond established preconceptions of biological ‘Just So Stories’ (Gould and Lewontin 1979). I am coordinator of this project which is funded by the Horizon 2020 Research and Innovation Programme under EU Grant Agreement no. 686585, and brings together experts from the universities of Newcastle, UK; the West of England (UWE Bristol); Trento, Italy; the Spanish National Research Council in Madrid; LIQUIFER Systems Group, Vienna, Austria; and Explora, Venice, Italy and runs from April 2016 to April 2019. Envisioned as a freestanding, next-generation, selectively programmable bioreactor composed of integrated building blocks (microbial fuel cell, algae bioreactor and a genetically modified processor), which are developed as standardised building segments, or bricks, the project explores how metabolic agents that are carried by liquid flows can be orchestrated by advanced electronics and (bio)technologies to perform useful domestic ‘work’ such as making electricity, clean water, removing pollution and producing specific substances like inorganic phosphate.
This book is, therefore, an accumulation of thoughts, studies, propositions, experimental texts and transdisciplinary experiments that embody the story of liquid life. The aim is to establish a set of principles from which the design, engineering and construction of our living spaces may be brought to functionality, although a detailed study in relationship to architectural projects is not provided and will be the subject for further publications. Constituting an experimental platform that resists a linear narrative by fluidly interweaving quotes with personal observations, experiments, and creative writing, Liquid Life: On Non-linear Materiality comprises a liquid manifesto that stands ‘against’ the mechanical metaphor of the bête machine. Within its substance, it documents how native liquid technologies can support human development in ways that respect the innate liveliness, ingenuity, and fertility of our planet.