

**Art
meets
health
and
biomedical
research**

ART4MED

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biomedical
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A R T 4 M E D

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Intro,

René Laennec, the inventor of the stethoscope, was also a musician. His skill in carving his own wooden flutes led him to invent the stethoscope in 1816, while working at Necker Hospital in Paris where he was following patients with chest pains from bedside to the autopsy table

By **Ewen Chardronnet**

René Laennec, the inventor of the stethoscope, was also a musician. His skill in carving his own wooden flutes led him to invent the stethoscope in 1816, while working at Necker Hospital in Paris where he was following patients with chest pains from bedside to the autopsy table. He was able to correlate sounds captured by his new instrument with specific pathological changes in the chest, effectively pioneering a new non-invasive diagnostic tool that revolutionised medical practice.

Medical equipment has played a key role in many scientific revolutions that have extended our means of observation beyond the five human senses. Nevertheless, the current supply chain limits access, creativity and customization. Citizen science, hacker/maker movements, DIY culture activists and investigative artists have addressed this problem by sharing open designs of small scientific instruments and innovative equipment. These efforts join the larger movement of frugal science, which advocates developing and distributing affordable and accessible scientific tools to tackle Global Health issues.

Questions such as "Do I own my body and all it is made of and produces?" may seem to have straightforward answers, but they cannot be taken for granted in the context of pharmacological treatments, where health and genetic data is collected, stored and commercialised by corporations. These issues of control, ownership and governance of one's own body, all of which have serious individual repercussions, especially in the case of marginalised bodies, can be raised and explored through artistic practices.

Contemporary investigative artists are also engaging in discussions around policies of access to healthcare, global issues related to development aid through training and empowerment (from the socially marginalised to the ethnically racialized minorities of both heavily industrialised and less industrialised countries), the claim of corporal autonomy, "xenopolitical" subversion and the desacralization of science and academic

medicine. Artists remind us that subversion, or at least established points of resistance, is a precondition for citizens to take control of the challenges posed by science.

Medical professionals, living labs and open science communities appreciate these creative mindsets, as well as their unique approaches to discussing ethical values and equity in access to healthcare. But these fragile collaborations still have difficulty finding dedicated frameworks for fruitful production.

In order to tackle these issues, in autumn 2019 we proposed to form a consortium: five partners from five EU countries united around a common interest in experimenting and disseminating collaborations between hands-on medical humanities and investigative art methodologies. Little did we know then that we were about to enter two years of a global pandemic. The ART4MED consortium formed in November 2019, on the eve of the SARS-COV-2 outbreak, and we began implementing our program in December 2020. We saw the purpose of our project - to foster encounters between arts practices and health and biomedical research - as more relevant and urgent than ever. We also adapted our activities to consider marginalised groups who are excluded from healthcare, as well as global migration, environmental health collapses, and the need for radical care during these pandemic times. In 2021 and 2022, ART2M (FR), Bioart Society (FI), Kersnikova Institute (SI), Laboratory for Aesthetics and Ecology (DK), Waag FutureLab (NL), proposed five art/science long-term residencies, symposiums, talks, co-creative methodology workshops, online collaborations, hands-on sessions, exhibitions, and a final festival in Paris. This publication looks back on the five long-term residencies hosted by each partner during these two years and reflects on their various research, collaborations, experiments and creations.



Oula A Valkeapää
Photo by: **Antze Greie-Ripatti**

Edito,

Art and medicine – early warning systems and collaborative world makings

By **Adam Bencard**

The ART4MED project has as its stated and admirable aim to foster encounters between arts practices and health and biomedical research. Such encounters have long and complex histories of their own, but they seem to hold a particular urgency and vitality today. The past pandemic years seems to have, if nothing else, put a stamp on the 19th century German physician and key driver of cell theory Rudolph Virchow's statement that "medicine is a social science, and politics nothing but medicine at a larger scale". Beyond the pandemic, this entwinement of medical science and social, cultural and political worlds is even further echoed in the broader public health landscapes of post-industrial societies in which the majority of disease states and health problems are characterized by being complex, multi-factorial, lifestyle-related and environmental embedded, rather than single-origin, biologically specific and causally identifiable entities. Distinct knowledge regimes and clear-cut disciplinary practices are coming up short as a response to these messy situations; we are clearly in situations in which it is "'discipline' that need explanation, not promiscuity," as Dez Fitzgerald and Felicity Callard writes in a study of experimental encounters between social science and neuroscience (Fitzgerald and Callard 2014, p. 23). They ask how human scientists – and we might add artists and medical scientists to this list – are to produce knowledge "amid a growing realization that those boundaries are pasted across objects which are quite indifferent to a bureaucratic division between disciplines; and that scholars and researchers of all stripes invariably attend to, and live among, objects whose emergence, growth, development, action, and disappearance do not at all admit of neat cuts between the biological and the social, or between the cerebral and the cultural" (Fitzgerald and Callard 2014, p. 23).

Creating lively encounters between arts practices and health and biomedical research as ART4MED has done is thus, amongst many other things, a genuine and important way to grapple and stay with the contemporary problems of health and illness. The projects in ART4MED are rich and polysemous, open to many forms of analysis. They partake in a steadily growing movement aimed at producing the forms of knowledge suggested by Fitzgerald and Callard. Rather than forcing them into a single paradigm or frame, I would like to use this foreword to suggest two functions or perhaps sensibili-

ties that seemed to me to resonate within the projects. They are two amongst many, and could be described otherwise, using other words, terms or inflections; they were just what appeared to me.

Early warning systems

In a 2021 roundtable talk on *Medical Imaging and the Contemporary Clinical Encounter*, artist and Reader in Technological Embodiment and Creative Practice at Edinburgh College of Art, Beverly Hood, pointed to an important potential of encounters between art and medical science: That of an 'early warning system'. While such encounters cannot and should not be reduced to this single function, there seems to me to be something particularly timely and rich in this idea for our current moment, a moment in which we are seeing both an unprecedented expansion of and struggles over medical sciences and practices. Put more directly, the need for such warning systems stems from the massive expansion of medical thought and practice. As medical sociologists have argued since the 1970s, our Western societies (and indeed increasingly with global reach) have become *medicalized*. In the introduction to his evocatively titled book *Is Medicine Still Good for Us? A Primer for the 21st Century*, the medical ethicist Julian Sheather notes the unparalleled reach and success of Western medicine and medical science. From antibiotics to vaccinations, heart surgery, genetic therapies and much, much more, medicine has invaded every aspect of both our individual lives and the societies we inhabit, shaping ideas and experiences of health, illness and mortality; much of human existence from the womb to our death beds have become domains for medical thought and intervention.

It is within this landscape that the idea of encounters between art and medicine serving as early warning systems might hold purchase; as a meaningful and important way to probe at the cracks and fault lines in the entangled spaces of bodies, technologies, knowledges, experiences, imaginations and practices that make up the modern medical complex. Which bodies are made visible and invisible? Which experiences are counted and which are denied relevance? Encounters between art and medicine can help register where this complex is developing such gravitational force as to shape both

patients and practitioners, institutions and knowledge systems, in ways that might not only stifle but actively damage the health and wellbeing of the multitude of people within its sphere of influence. One of the classical examples of early warning systems are the canaries that miners would bring with them into the coal mines as a way to detect toxic levels of carbon monoxide; once the birds starting passing out, it was time to leave before the miners were next. Artists are not canaries instrumentally exploited to preserve an extractionist system; nonetheless, there is something about the scene that holds sway: Venturing together into unknown terrain, detecting toxic forces that can remain below levels of detection until their damaging effects occur. What art might be said to offer medicine (the 4 in ART4MED), then, is a critique of and a drawing out of the possible dangers and toxicities hiding in its practices, institutions and knowledge paradigms. We see this clearly in the work of Edna Bonhomme, Luiza Prado de O. Martins and Nazila Ghavami Kivi in the m/other project with LABAE, in which questions of pain, motherhood, exclusions and obfuscations within disciplinary frameworks are brought to the surface, and new practices of care and tenderness are enacted in the face of such structural violence. The work of Adriana Knouf with the Waag Futurelab similarly examines notions of the commensal in order to probe at what is both in- and excluded.

Making new embodied worlds

Alongside the mode of warning system, the encounters staged in the ART4Med projects also holds firmly on to another value: That of making something new together. Here, the 4 takes the form of an invitation, an opening into a new, different space created from the encounter. Interactions between art and science have traditionally been seen as important because of the need to counter a certain reductionism built into scientific medicine – art as a way to insert a wider set of perspectives on the human experience into a biological and disease-oriented framework. How to care better, how to view disease in a more existential framework. What does illness mean? What does it mean to be well? Modern medicine is powerful in its attempt to move between observation of patterns, hypothesis testing and theory (or model) development regarding the causes and potential treatments for disease. However, disease and healing are not just technical problems to be solved, they pose pragmatic and moral challenges for individuals and societies and they form imaginary landscapes that shape dreams, ideas and futures. They make worlds. And because they make worlds, they must be explored imaginatively, experimentally and critically. Both to inform of the shape of the terrain and to bring back warnings of the dangers they hold. Encounters between artists and medical science and scientists can make up such exploration teams, as they make expeditions into the tangle. The Mnemonia project examinations across biomedicine and reindeer herding practices is a wonderful example

of such collaborative world-making, as is the work of artists Helena Nikonole and Lucy Ojomoko with the Kersnikova Institute on quorum sensing. The *UNBORNOX9* residency likewise marks a very literal attempt to utilize both artistic and scientific knowledge practices to create new things together.

These ART4MED projects and this volume thus document and represent a series of such valuable and vital examinations of medical worlds and world-makings. While differing in methodology and aims, the five projects seem to me to share the sensibility of both the early warning system and the imaginative guide to new embodied worlds. You might prefer other tools with which to grapple with them; that is part of their richness and the ways in which they genuinely respond to the complexity of the situations and topics they engage with. ART4MED, then, presents richly-textured ways of understanding medicine as a practice and a science, and understanding health, illness and medical care in relation to individual subjective experience. Ultimately, it partakes in an ongoing effort to reimagine and reconsider the ways in which both artistic and medical knowledge might contribute to human flourishing.

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Insights,

From reappropriation of biotechnological apparatuses to deep trans-species mutualism: transitioning in Xenological Preterrelations

By **Maro Pebo**

Our bodies function and transform on a biochemical, molecular scale – the most intimate level of our physicality. Even at this level, there are politics that regulate us. Here, we see the pharmacological biopolitics that Paul Preciado describes as a “Pharmaco-Pornographic Regime,” where there is an increasing level of control of our bodies through multifaceted regulation of sex, gender and sexuality, and where the level of bodily control is indeed molecular. Paul Preciado proclaims the need to strategically reappropriate biological apparatuses, particularly hormonal supplementation, as a form of revolutionary resistance. This essay contextualises the work of Adriana Knouf in the discourse and among related research works.

Biohacking practices are part of the resistance to heteronormative and dualistic gender construction. Within this transhackfeminist approach, Preciado demands biocommon ownership of the biocodes of gender, sex, and race (outside of private corporations and the pharmaceutical industry) with a form of organisation called technosomatic communism as an alternative.

Artistic practice as a form of resistance and research through biohacking has a precedent in Mary Maggic’s 2016 collaboration with Byron Rich, *Open source estrogen*, which uses solid-phase extraction for the DIY collection of hormones from urine. Their recipe and process could be applied in an average kitchen. This project raises the issue of shared hormones between bodies, as well as access, regulation, and self-determination of the biochemicals that are so transcendental in helping us “feel more in line with the lives we want to live.”

Pushing forward the idea of accessibility and open source production, Rian Ciela Hammond developed *Open Source Gendercodes* (2017). This project aims to give communities and individuals the ability to

produce their own hormones by growing them in a bioproduction system, such as a transgenic plant that supplies the substances in the tissues. Rian focuses on the engineering of tobacco, soy, and yeast. A trans-species relationship is established with *Agrobacterium tumefaciens*, a soil bacteria that can insert genetic modifications into the plants it invades in the wild. As it becomes possible for bacteria and plants to participate in the autonomous production of hormones, the presence of other species becomes more central within xenology, the study and analysis of the alien and the other. Xenology comes from both science fiction and science fact, and Knouf expands its usage to encompass “the full breadth of what it means to be xeno” (Knouf, 2020).

Xenology also looks at the extraterrestrial other and the possibilities and conditions under which we could access off-planet environments and life. In order to explore the politics of accessibility of space travel for (trans) human bodies, Knouf developed *TX-1* (Knouf, 2021), which launched samples of her hormone replacement medications, “marking the first known time that elements of the transgender experience orbit the earth”.

Following the logic of adaptation as a means to survive in extreme environments (such as outer space or places like Antarctica), Knouf came across resilient and complex organisms: lichens. In contrast to fragile human bodies, some lichen species have characteristics of resistance to extreme conditions (such as high levels of UV light or cosmic radiation) that make them ready for potential space travel. In fact, their resistance has already been tested experimentally under space travel conditions.

Another particularity of lichens, when viewed through a xenological lens, is that they defy conventional classification because they are an interspecies symbiosis formed by fungi and a photosynthetic symbiont such as cyanobacteria or algae. These living elements are

so closely intertwined that they are classified as one composite organism. Their symbiotic associations have become a crucial point of reflection, along with longer life spans, deeper time, and deep mutualisms. Lichens have been used both as bioindicators, because they are very sensitive to their environments, and as remediators, because they are involved in transformation. For example, lichens are often the first organisms to grow back on matter that derives from volcanic eruptions. Lichens stand apart for their many particularities and how they challenge taxonomic classification and notions of fixed identity.

Returning to the molecular biopolitics and hormonal dimension of xenology, and continuing the trans-species path and the challenges to classification, Špela Petrič’s work, *Phytoteratology* (2016), embodies the desire to conceive and mother a trans-plant. In her work, embryonic tissue from the thale cress (*Arabidopsis thaliana*) is nourished and grown in Petrič’s hormones. As in Mary Maggic’s work, the steroids are extracted from the artist’s urine, but in this case, are used to assist the development of the embryo.

The desire to co-create hybrid species, and to think of life in space, is also present in works such as *Codex Virtualis* (2021, ongoing) by Interspecifics. This project stretches conventional definitions of life, experiments with a semantic coupling of algorithms comparable to the life mechanisms of microorganisms, and progressively redraws novel delimitations of life. *Codex Virtualis* is an AI-art-science research framework oriented towards the image synthesis and evolution of an open-ended taxonomic collection of new-to-nature speculative life forms. The framework is relevant to the current discussion because it focuses on values of collaboration and exchange in the quest for diversity and survival both in algorithms and in microbial life.

Adriana Knouf’s work, *Xenological Preterrelations*, developed a relational dimension to the themes of collaboration and exchange in the “Preparing for Uncertain Times” speculative writing workshops. The practices of writing and reinterpreting text channel the tradition of works such as Sophie Calle’s *Prenez Soins de Vous* (“Take Care of Yourself”, 2007), where she invited people to offer 107 multi-format interpretations as reactions to receiving a letter of separation that had affected her personally. In their many formats, the interpretation letters are often very poetic and revealing of their authors, depending on their jobs and professions. In other words, letters are a space for reflection that brings forward elements of ourselves and the relationships we establish with the reader and time. There is a time gap between when the letters are written and the moment when they are read. In her workshops, Knouf fully explores this gap by experimenting with deeper times—the time frames of lichen’s long lifespan, of space travel or environmental futures.

Participants are first introduced to lichen as a composite organism by its conventional life-sciences definition,

and slowly delve into the lesser-known qualities that inspire ecologically mediated transition. After providing guidance about how to recognize and spot them, Knouf led participants to search for lichen in the surrounding environment. Participants documented what they observed through magnifying glasses, noticing what is usually ignored during our everyday lives. By learning about lichen, looking for them, and examining their characteristics, a relationship with the lichen begins to form—a curiosity full of questions about the experience of the other. This initial exposure prepares the participants for writing the letters (rather than responding to a text as in the Sophie Calle example). After the embodied experience of searching, finding, and observing the lichen, the participants were ready to write their letters. In many cases, this (queer) science fiction-informed process triggered empathy and became a platform to explore new futures.

In working with multispecies communities for the workshops, relationships became more prominent. Within these multispecies relationships, it became apparent that it is fundamental to understand ourselves in continuity with the symbiotic complex other – not in opposition to it. Part of the continuity is learning, to paraphrase Knouf’s words, a lesson from the lichen on *how* to transition: not only through technologically mediated biohacking as resistance to pharmacological biopolitical regimes, but also, as in the life of lichen, that transitioning can be viewed as natural and ecological.

Focusing on the life of organisms that are better suited to the extreme conditions of space travel than humans, and with the safe return of the *TX-1* bits of hormone replacement medications to Earth, *Xenological Preterrelations* becomes a sign of resilience and hope – not only for survival in space beyond our atmosphere, but also for returning to the ground of our damaged planet.

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Time, technological imagination, and memories of birds, returning

By Marianne Mäkelin

Migratory birds' lives unfold with little mind to borders drawn on the land below. While some of us attach ourselves to houses with heating, plumbing and other municipal comforts, for the birds, home is in this circular leaving and returning. A migrating bird does not belong to a place but to movement that follows seasonal variations, manifested by the shortening day, by changes in the wind, by the colour of the leaves. It is in this sense that the Sámi author Johan Turi¹ has compared the lives of reindeer and nomadic reindeer herders to those of migrating birds. As the birds and reindeer herders inhabit a landscape, the notion of dwelling is marked by the cycle nature of the Earth orbiting the sun. The sense of home that Turi evokes is not attached to a building or a piece of land but to the landscape itself, ever changing but constant, and shared with its other inhabitants.

Philosopher Elizabeth Grosz², for her part, writes about how time is perhaps best not understood as a simple line extending from past to future. For Grosz it is not a circle either, because time does not repeat itself and is irreversible. The past does not predetermine the future; yet, all future is contained in the past as possibilities and virtualities. This means that the future is open, not set on a specific path but changeable at any moment. It also means that the future does not come into existence as something that breaks from the past, but rather as something that arises from its potential. If time has a cyclical nature, it is in how the past is actualized in ever new ways, as returns that are not repetitions.

A story of a return: in 1822, a stork was shot down by a hunter in Germany and found to have already been pierced by a spear through its neck. Based on the design of the spear, European investigators deciphered that the bird had flown all the way from central Africa injured in this way³. The wound on the stork became a clue to the puzzle of where the birds vanish during win-

ter. Until then, it had remained a mystery to the people who stayed behind. Aristotle had suggested that they hibernate like many other animals do, perhaps under water. Or maybe, as one 17th century theory explained, birds flew away to the moon. The ensuing argument was that in this case, humans could surely follow, if only they could find the means. The foreign spear, however, pointed towards another kind of faraway land. Its inscriptions were interpreted as a story of the stork's journey. As for the wounded stork, its travels ended, and to this day it remains taxidermied and on display at the University of Rostock, with the preserved African spear still piercing its throat.

The figure of the gene, it seems to me, speaks of a way in which we have tried to make sense of how our bodies contain what has been before and what might be. Like time, it tells a story of both limits and moldability, about how what we are is not predetermined nor is it completely open, about what unfolds in the gap between what is given and what might be. Both knowing and genetics are intertwined with this hope of knowing and changing what before appeared as destiny. I imagine the geneticist I am thinking of here as some kind of wayward psychoanalyst, wielding needles, microscopes and databases, hoping to find answers to questions such as "Where do I come from?" and "What is wrong with me?" Hoping to reach the past in the present and find it stored somewhere, with the promise of solvability and certainty that we tend to concede to those aspects of reality we call material.

All this focus on individual becoming was, of course, never the whole story. Bodies are porous, as are ways of dwelling in time and in landscapes. Emilia Tikka, Oula A. Valkeapää and Leena Valkeapää's work *Mnemonia – The Memories of Birds* imagines a world where the technological moldability of life grapples with this. The gene has sometimes been held as an emblem of

predetermination and individualised descent, in both the sciences that study it as well as beyond. I wonder, however, if it is not through the temporality of being that genetics comes to speak about connections. My body is not mine alone; it was passed on to me by generations before; and it may live in time as pieces in others' bodies. Or not as pieces even, but as some kinds of scrambled and rearranged possibilities. In this way, too, all our bodies are haunted by pasts and futures.

Likewise, developments in epigenetic studies have inspired ways to reinterpret what genetics is and what individuality means. Epigenetic studies have highlighted the ways in which processes that happen outside the genome result in changes in the organism's observable characteristics, and how these changes might be heritable. The latter part, the heritability of what happens outside the genome, is what has sometimes been seen as a return of environmental influences into understandings of genetics which, for some time, maintained that only what was inscribed in DNA would be preserved in time. This is not to say that epigenetics somehow stands in contradiction to knowledge about genetics.⁴ Rather, epigenetic functions operate as a kind of additional layer of mechanisms through which evolution works, through which we come into being, and which are passed on through time, to subsequent generations.

Mnemonia latches on to how both genetics and epigenetics alike are ways of approaching how our bodies are stretched across time, how they are bound in place, and what is carried through generations. The way cells store the past is drawn on as a kind of materialised mnemonic device that builds on the hope that shared skills and ways of life might still retain an existence somewhere, hidden in microscopically small parts of the body. This existence is harnessed to bring back forgotten memories from across time and across species. It is this latter notion, of a transcorporeality extending across species boundaries, that unsettle some of the focus on the descent of individualised species that perhaps is retained in how genetic technologies are imagined. Instead, it imagines a shared past, a shared presence, and a shared future that become both embodied and moldable.

The politics of imagination inherent in technologies has to do with the way it solidifies some ways of making, say, the gene matter. For Grosz, politics is what lies between an unchangeable past and the future that stretches out from this past. If the future is open and present in what is possible, in this moment, in time's unfolding, negotiations about how to live together in new ways are possible.

Tikka, Valkeapää and Valkeapää's notion of living with the ruins – not towards some eventual utopian state of being, but with what the past makes possible now – draws from the thinking of Anna Tsing who, along with Elaine Gan, Heather Swanson and Nils Bubandt, has

also talked about how both pasts and futures haunt all landscapes. Landscapes, as well as the bodies dwelling in them, carry signs of what has been. These can often be felt only indirectly, as eerie presences or absences, as traces such as the loss of an animal species being followed by changing vegetation elsewhere. Or, as ways of inhabiting landscapes and temporalities that become possible or impossible with the changing world. Futures, too, can have a haunting presence due to exchanges and sacrifices made today in the name of dreams of technological progress. It is in this way that imagined futures bear their marks on today's ways of inhabiting the planet.

Inscriptions, ghosts, genetic memories; like a story contained in the remains of a long dead reindeer. With the right tools or sensitivities to see or to remember, a landscape is teeming with ways of being that might not be gone, and with what they might make possible. How does a landscape remember, and who does it dream of? Perhaps a memory could be something else than just a component of a life story of an individual's coming into being, fixed in the past, scaffolding the present. In *Mnemonia*, memories are formed and re-membered at the juncture of landscape, reindeer and human, of beings that have passed through, leaving traces on what has come into existence. Borders between past, present and future become rescrambled; a line of flight is drawn.

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Feeling Myself – Self-feeling and the Forking of the Path

By **Domen Ograjenšek**

As the environments change, the matters of the skin overtake those of the heart and mind.

In the Anthropology section of the *Encyclopaedia*¹ Hegel outlines the dialectical process of constituting individuality. One begins by following the human being as they awake, rise to their feet, begin to walk, and speak². It might sound straightforward, yet at this stage, humanity is still deeply embedded in the natural flow of things. Finding themselves in the grip of nature³, shaped by their immediate externality, the human has no other choice than to turn inward: away from the world and into their very self (where they would eventually discover themselves as a totality, distinguishable from the world that has determined their existence for so long). The path that the human as a natural subjectivity takes on its way towards self-determination or freedom is for the most part something that coincides with the more “intuitive”, observational qualities attributed to human life: such as the influence of climate and geography (shaping what would be the being’s predisposition, temperament, and character), the ages of life, alteration of sleep and waking, and opposition as experienced in the sex relationship.⁴

To a contemporary reader, this manner of deduction may seem simplistic or outdated, and rightly so. Hegel’s Anthropology has been criticised for its myopic treatment of the human subject, pointing out how the philosophical conceptualisation of the human being fails to account for the bodies marked by race, gender, and disability⁵. As the development of the Anthropology is focused on the soul rather than the body, and as the development can only take shape in the form of overcoming the particularity of nature, it raises the

question: What may be the implications for those whose embodiment positions them within Hegel’s system as closer to nature?⁶

Nature does, indeed, play a crucial role in the Anthropology, and the natural subjectivity is also most certainly set on course to overcome the determinations set by nature, yet it also seems that the opposition between nature and reason, or between particularity and universality within Hegel’s system, does not necessarily lead to the modern exclusionary understanding of the two. As Luca Illetterati points out, “[...] nature is external not in the trivial sense of being what is in front of the human, beyond it or at its disposal, either as a pure objectivity that can be used and abused, or as a world dominated by laws that are completely autonomous and independent of subjectivity. [...] Rather, nature is external because it is the flesh within which the logos takes shape, because it is the first condition of having something like the real, like the world.”⁷ Nature in this sense is never something that is truly overcome in Hegel’s system. What the author defines as “Hegelian naturalism”, is a rather non-naturalistic naturalism, in which nature ceases to persist as a standalone ontological space that would be opposed to the dimension of the human, history, or freedom.⁸

This on the one hand complicates the implicit value that judgments attributed to the supposed hierarchical understanding of nature and reason in Hegel’s system, while on the other hand opens up the dialectical progression to the constitution of trans-morphous subjectivities. As soon as nature ceases to be something that is defined solely by its exclusionary opposition to reason, the dialectical process gains a certain *plasticity*. The natural soul that has escaped the pressures of external forces by retreating into itself becomes the *feeling soul*, and furthermore the *feeling of self*. Yet,

as emphasised by Catherine Malabou, this process of seeming progressive illumination does not materialise without some abrupt returns to obscurity.⁹ “The spirit that awakens knows also crises of somnambulism, delirious manias; at times it consults the stars or magnetizers, at times it weeps endlessly over those it has lost whom it never managed properly to mourn. It haunts its own depths, its own night, failing to commit to the individuation which will be its definitive splendour.”¹⁰ Self-feeling becomes a state of crisis. The subject gains possession of itself, acquires consciousness, yet since in its immediate state the corporeality and spirituality cannot be fully distinguished, it is still prone to disease:

“Subjectivity does not reside in its own being, it ‘haunts’ itself. The soul is possessed by the possession of itself.”¹¹

What eventually saves the subject from the clutches of self-possession is the habit, a new form of relation to the subject’s body¹², which becomes its second nature. Withdrawn into itself the subject struggles: over-focusing on itself it can get lost in the emptiness of ideality, whereas clinging to a particular part can cause it to become isolated from the whole¹³. The habit allows the soul to move within “the whole” and possess “the part” without feeling or consciousness of the fact¹⁴ – without getting overwhelmed by it. Just as demonic possession is resolved by way of “normalisation”, be it through the process of ritual cleansing or exorcism, that in effect re-entangles the light of logos into the impenetrable darkness of body as mere flesh, the habit centres and remoulds the chaotic subjective forces of self-possession. It moves the subject further along the path of overcoming nature, yet not necessarily in the sense of cultivation. By utilising the entanglement of the psychic and the somatic in the self-feeling, it makes for a plastic operation that transforms the body into an instrument¹⁵, overcoming and taking ownership of its internal oppositions.

There is no clear reason why the function of this instrument should be limited by the humanist goal of the system in place. The self-feeling chapter delivers an implicit forking in Hegel’s system that a plasticity-oriented reading can use to trace alternative points of usage and function of the habit as a plastic operation and the body as its instrument. The development of self-possession could host multiple topological expressions. As the bodies adapt to changing environmental demands, alternative subjectivities could form as its outcome. The spirit still bears unexpressed potentialities. It might be up to future speculative endeavours to decode them. The barriers that once held together the interiority required for the plastic constitution of the conscious self might then form their own reflective systems¹⁶, drawing out the innate “experientiality” that

we tend to consider as the self – drawing it out from the depths of flesh to the surface of its barrier organ, the skin, where it could fester. This is the potential of the para-subjective phenomena already populating our bodies¹⁷: laying the foundations for the swarm-like subjectivities of the future, symbiotic selves, essentially contingent, multiple, ever adaptive.

Notes

1. G. W. F. Hegel, *Philosophy of Mind* (Oxford: Oxford University Press, 2007).
2. Catherine Malabou, *The Future of Hegel* (Oxfordshire: Routledge, 2005), 23.
3. Jane Dryden, “Hegel’s Anthropology, Transforming the Body,” in: *Hegel’s Encyclopaedia of the Philosophical Sciences, A Critical Guide*, ed. Sebastian Stein, Joshua I. Wretzel (Cambridge: Cambridge University Press, 2021), 129.
4. Jane Dryden, “Hegel’s Anthropology, Transforming the Body,” 129.
5. *Ibid*, 128.
6. *Ibid*, 127.
7. Luca Illetterati, “Nature’s Externality: Hegel’s Non-Naturalistic Naturalism,” *Problemi*, vol. 58, no. 11–12 (2020): 66.
8. Luca Illetterati, “Nature’s Externality: Hegel’s Non-Naturalistic Naturalism,” 66–67.
9. Catherine Malabou, *The Future of Hegel*, 28.
10. Catherine Malabou, *The Future of Hegel*, 28.
11. *Ibid*, 35.
12. *Ibid*, 37.
13. *Ibid*, 37.
14. G. W. F. Hegel, *Philosophy of Mind*, §410.
15. Catherine Malabou, *The Future of Hegel*, 38.
16. “[ART4MED] HELENA NIKONOLE, LUCY OJOMOKO: ‘Quorum Sensing: Skin Flora Signal System’, *Kersnikova* (November 2021); online at: kersnikova.org/en/posts/events/all/art4med-helena-nikonole-lucy-ojomoko-quorum-sensing-skin-flora-signal-system
17. See kersnikova.org/en/posts/events/all/art4med-helena-nikonole-lucy-ojomoko-quorum-sensing-skin-flora-signal-system

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Illetterati, Luca. “Nature’s Externality: Hegel’s Non-Naturalistic Naturalism.” *Problemi*, vol. 58, no. 11–12 (2020): 51–72.

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UNBORN0X9, from homunculus to partial ectogenesis

By Ewen Chardronnet

"Ectogenesis will, in making the growth of the child directly visible, actually 'enhance rather than diminish the value we place on the fetus' – arguably, ultrasound imaging has already had an effect of that kind." Philip Bal, *Unnatural: The Heretic Idea of Making People* (The Bodley Head, London, 2011)

It is now almost impossible to read about ectogenesis (gestation outside the body) in the press without an immediate introductory reference to the artificial wombs of the "hatcheries" in Aldous Huxley's novel *Brave New World* (1932). The current technological context, however, goes far beyond the techno-scientific context and the ethical debate that led Huxley to write his novel 80 years ago. In her thesis in Law presented at the University of Manchester in 2020, "Regulating the 'Brave New World': Ethico-Legal Implications of the Quest for Partial Ectogenesis"¹, Elizabeth Chloe Romanis explores the legal framework implied by the emergence of "Perinatal Life Support" systems² – or artificial wombs for the last phase of gestation of very premature babies – in relation to Huxley's "classical" vision of ectogenesis.

E.C. Romanis distinguishes between two types: complete ectogenesis, the "historical" vision of the artificial womb, and partial ectogenesis, which defines the technologies of "Perinatal Life Support". She identifies three fundamental changes in our views of pregnancy that partial ectogenesis would bring about. The first change suggests that partial ectogenesis will have "the obvious benefit of saving the lives of babies born prematurely and reducing the suffering of women whose wanted pregnancies spontaneously abort by providing a means of continuing gestation artificially"³. The second also opens up the possibility that pregnant women who experience dangerous but wanted pregnancies "would no longer have to make a

decision between continuing to carry their pregnancy at severe risk to themselves, delivering and risking their fetus facing bleak outcomes in neonatal intensive care, or having an unwanted abortion"⁴. Finally, the third change would involve assuming ectopic gestation "as a tool in the emancipation of the female body and of maximising choices for females about how to use their body to reproduce by minimising the potential burdens of pregnancy. This argument is usually made in the context of complete ectogenesis"⁵. If this technology becomes a reality, its regulation will raise an exceptionally complex set of questions that the legal framework and medical ethics do not yet know how to answer.

Before going into the questions that this raises and the light that E.C. Romanis brings in her remarkable essay, I would like to return here briefly to the cultural history of *anthropoeia*, the artificial creation of humans⁶ and the ontological foundations of the UNBORN0X9 project.

Homunculi in alembics

The dream of creating "little humans" outside of women's bodies is not new. The product of an ex utero human entity is reminiscent of the *homunculus* (from the Latin, "little man"), the artificial human being that some alchemists sought to obtain in the Middle Ages⁷. Homunculi are most often described as imperfect and unfinished sketches, very small in size. The recipe for making a homunculus is given by Paracelsus (1493-1541), physician and alchemist, in his *De natura rerum* (I, 1, sect. 9)⁸.

The homunculus of mediaeval European alchemy also has an antecedent in Islamic alchemy: it is the takwin

(تكوين), which is the artificial recreation of life in the laboratory⁹. Obtaining a takwin was the obsession of many Ismaili Muslim alchemists, including the legendary Jâbir Ibn Hayyân (who became known in Europe in the Middle Ages by the Latinised name of Geber) in the 9th century. His *Book of Stones*¹⁰ includes several recipes for creating creatures such as scorpions, snakes and even humans in a laboratory environment, which are under the control of their creator.

The concept of the homunculus also echoes the theory of preformationism, which was very popular among mediaeval scholars to explain the development of the embryo. According to this theory, a man's sperm contains a miniature version of the unborn child (the homunculus), fully formed and functioning, but so small that it is invisible to the naked eye. The mother's uterus acts only as a receptacle, a "nest" in which the homunculus is deposited during the sexual act to develop and grow. The child's heredity therefore depends solely on the father, the mother merely playing the role of an 'incubator'. This reflects the desire of men to see themselves at the origin of all creation.

With the discovery of spermatozoa (for a long time called 'animalcules') in 1677 by Antoni van Leeuwenhoek¹¹, the theory of preformationism was popularised. Scientists such as Nicolas Hartsoeker asserted that the homunculus, a microscopic replica of the fetus, was housed in the head of the spermatozoon¹². Some of them, like François de Plantade in 1699, even claimed to have succeeded in seeing it under the microscope¹³. The theory of preformationism gradually died out during the 19th century, with the rise of experimental embryology and the theory of evolution.

However, the idea of the alchemical homunculus lived on in literature, notably in Goethe's second *Faust* in 1832, where at the beginning of Act II, Wagner, Faust's former assistant, is busy alchemically creating a little man. Through Wagner's story, Goethe is certainly taking aim at the presumptuousness of power-ridden scientists.

The idea of gestation outside the body can also be found in esoteric or scientific fantasy literature of the early 20th century, but it was after the First World War that science began to seriously consider the possibility of the artificial womb.

Today and Tomorrow

The first real scientific mention of artificial wombs came about a hundred years ago, in 1923, when J.B.S. Haldane, a young British biologist and geneticist, was invited to give a lecture at the Heretics' Society at Cambridge University. The Society, founded in 1909, was not an occultist fraternity but rather a haven for progressive intellectuals to question traditional authorities and religious dogma. The English philosopher Charles Kay Ogden, its founder, who considered himself an "intellectual emancipator", invited many intellectuals of the time and encouraged them to be non-conformist and provocative¹⁴. Ogden invited Haldane to give a voice to "reformist" eugenicists in progressive or socialist circles who sought to reconcile the search for a revolutionary horizon, the defence of feminist claims, and the advent of a "new human", conceived on biological grounds.

Haldane's presentation to the Heretics' Society audience, entitled "Daedalus, or Science and the Future"¹⁵, is written from the perspective of a student in 2073 writing about the advances in biology over the previous 150 years. Among other things, the student describes food and synthetic biology, assisted reproductive technologies, but also introduces the concept of ectogenesis, describing how, in 1951, two scientists extracted the ovaries of a woman who died in a plane crash, fertilised her eggs, and then brought the fetus to term in a "suitable fluid". In the world described in this essay, humans have completely ceased to procreate according to the "former instinctive cycle", allowing for a more rational and enlightened reproductive process, the complete gestation of a fetus outside the body, which Haldane calls "ectogenesis".

The text of the lecture was quickly circulated as the first of more than 150 short books published by Kegan Paul over the next eight years in the "To-day and To-Morrow" series, all discussing radical political and scientific ideas. In his essay, Haldane argues for ectogenesis as a prime example of how science could bring about radical social change: by freeing women from the necessity of pregnancy, and where sex and reproduction would be dissociated, which he argued would radically alter the power imbalance in society.

Most of Haldane's friends and interlocutors rejected ectogenesis, although they shared his techno-optimism, his criticism of the nuclear family and his eugenic concerns. Bertrand Russell responded to him the following year in his *Icarus, or The Future of Science*¹⁶ to remind us of the great risks of misusing science.

Should women be freed from gestational "labour"?

The socialist and pro-sex feminist Dora Black Russell, secretary of the Heretics Society in 1918-1919 and

then wife of Bertrand Russell, would respond to J.B.S. Haldane as well. In 1925 she wrote *Hypatia, or Woman and Knowledge*¹⁷ in which she attacked the reduction of female sexuality to reproduction – in the context of an intensive campaign by the Labour Party's women for sexual reform and a policy of contraception and birth control – and defended an emancipatory conception of ectogenesis quite similar to that of J.B.S. Haldane. The very idea of artificial gestation would allow women to imagine a different social reality, she said, one in which they would not have to bear children and therefore would not be required to play a maternal role that kept them servile, confined to the home and out of the public sphere.

In 1927, Charlotte Franken Haldane – who married J.B.S. Haldane after meeting him at the Heretics' Society – published the science-fiction dystopia *Man's World*¹⁸ which depicts a future ruled by an elitist caste of male scientists who have organised the production of infants as a specific industry. This caste is guided by an ideology that controls and limits the number of female births¹⁹. Young women living in this world can become “professional mothers”, otherwise they are sterilised and become “neuters”. Scientists reveal to mothers that research is underway, using livestock, to enable *in vitro* fertilisation and ectogenetic pregnancy, thus beginning the process of the total eradication of the professional motherhood industry²⁰.

In her book *Halcyon, or the Future of Monogamy*²¹ (1929), the feminist and pacifist Vera Brittain proposes a candid vision of the future of monogamous marriage through the story of a fictitious Professor Huxterwin living one hundred years in the future. In Brittain's book, ectogenesis is first performed in 1971. “Only twenty years after Haldane's predicted date, an ectogenetic child was successfully raised through the embryonic stages and brought to 'birth' in Monet's laboratory. Unmindful of the worldwide ecclesiastical *furor* unleashed by this triumph, leading ectogeneticists in England, France, Germany, Russia and the United States immediately set about breeding embryonic children supplied by a small but slowly growing number of cooperative parents.”²² While in this account, ectogenesis proved perfectly safe and feasible, it is abandoned, Brittain points out that “the complete divorce of sexual relations from their consequences was never considered desirable, because of a risk that it might in time lead to the demolition of the human race”²³. In this sense, she was not in favour of ectogenesis, mainly because of the deleterious effects it could have on children and parent-child relationships.

Concluding a decade of debate in British intellectual circles, Aldous Huxley published *Brave New World* in 1932, echoing the concerns raised by Vera Brittain and Bertrand Russell. The novel is set in the year 2540 and depicts a world where sex is recreational, love is obsolete and the idea of family is obscene. A world state manufactures its citizens by fertilising embryos in test tubes, chemically processing and classifying them into

hierarchical sociobiological groups and then bringing them to term in a human “hatcheries”. This work by one man will live on for posterity as a testament to the British intellectual debate on the issue of ectogenesis in the 1920s.

UNBORNOX9: 0-9 months

The “0x9” in the *UNBORNOX9* project serves to remind us of all the stages from 0 to 9 months and the moral status that one attributes to this non-yet-human, non-yet-born. For on the one hand, there are those who argue that human life begins at or shortly after conception and should be given (at least partial) protection from that point onwards; and on the other hand, there are those who argue that the fetus is not a person in moral terms and therefore has no right to life before birth. In the middle are a number of positions that attempt to fall between these two polarised views. Some argue that the fetus acquires moral status during gestation, with the increase in moral status being either gradual throughout gestation or at a particular developmental threshold in gestation. This gradual or sudden increase in moral status raises many questions about the different phases of gestation over the 9 months of an unborn human organism.

An embryo is defined as a developing human organism before 8 weeks of gestation. In law, the embryo has no legal existence. Only the birth of a child confers a status. From an ethical point of view, the question of the status of the embryo is a never-ending discussion that is strongly influenced by everyone's beliefs and convictions.

In France, for example, research on embryos is authorised within a period of 7 days, a period that is only justified if the embryo is transferred to the uterus, since implantation in the endometrium occurs 6 to 7 days after conception. Beyond that, implantation can no longer take place. In the United Kingdom, the 14-day period has been adopted, because it corresponds to the formation of the outline of the neural tube (primitive nervous system). While recent scientific advances suggest that it would be interesting to go beyond this period to study embryonic development in *in vitro* models, there is very little support in the scientific community for the total removal of restrictions on embryo

research²⁴. If this accepted framework should therefore prevent the full gestation of human fetuses under artificial conditions for a long time to come, many scientific developments linked to Artificial Intelligence management of animal embryos in artificial wombs are still critically challenging this situation²⁵.

On the other hand, the transfer of a premature baby into an artificial womb could develop quite quickly and also raises questions about the ongoing moral debate about the right to abortion. For the record, it was Lenin who made Soviet Russia the first country to legalise abortion in 1920. Today abortion can be performed up to the end of the 12th week in most European countries (the time when the fetus begins to possess certain recognisable human characteristics), the 14th week of pregnancy in France, the 18th week in Sweden, the 22nd week in Spain and the Netherlands, the 23rd week in Canada, the 24th week in the United Kingdom and the United States (the viability threshold for very premature babies). Abortions may be performed after 24 weeks, especially when the mother's prognosis is vital. Beyond 28 weeks of gestation, the vast majority of these developing human entities would not be considered “extremely premature” if delivered and can survive with a good long-term prognosis. In the continuing debate over this particular time frame, pro-life movements in the U.S. see ectogenesis as a life-saving “solution” to abortion²⁶ because a pregnant person could be released from pregnancy without “killing” the fetus. E.C. Romanis points out in “Regulating the ‘Brave New World’”²⁷ that partial ectogenesis begins with the body of a pregnant person and *necessarily* involves the body of a pregnant person. Similarly, the decision to abort is a matter of the pregnant person's body and autonomy, and abortion is not reducible to a physical desire not to be pregnant; abortion offers pregnant women the opportunity to conclusively reject biological parenthood and/or social motherhood. Partial ectogenesis cannot be an “alternative” to abortion, a crucial point that the author rightly states²⁸.

Since the law is not able to deduce absolute truths about the moral status of the embryo, fetus or gestating entities ex utero, it is more important, as E.C. Romanis clearly states, to focus on the *extrinsic* value that might be afforded to gestating entities by those around them. “This extrinsic value will more often directly influence our perceptions about the gestating entity and the obligations that we may have towards it. There are concrete harms that materialise to surrounding persons as a result of how the entity gestating ex utero is treated. That is to say that, even if an entity exists ex utero it does not exist in a vacuum; it remains embedded in a particular set of complex circumstances, particularly in relation to the genetic progenitors of that entity. [...] whatever its intrinsic moral value, the human entity gestating ex utero exists in ‘a moral community and thereby [is] situated in a complex web of relationships [that] will provide the most fruitful framework when responding to ethical issues such as those generated by the abortion dialogue”²⁹ or, in the

case of this thesis, determining ethical treatment of the subject of an artificial womb. The subject of an artificial womb is a human entity that will be (often) meaningful to actors around it. It is still undergoing the process of gestation, though facilitated by artificial conditions. What is done, or not done, to this developing entity will impact on those around it, for example, those responsible for its conception and/or the former pregnant person, whether these are individuals who want to parent it or not.”³⁰

The future of partial ectogenesis

In the case of unsafe pregnancies, it is possible that artificial wombs in partial ectogenesis situations could sufficiently alter perceptions of the level of risk, to the point of justifying intervention to terminate a pregnancy on the grounds of an individual's health. Here again, E.C. Romanis is of much help: “Artificial Wombs could impact perceptions of viability and could, therefore, remove the importance placed on gestational maturity in obstetric decision-making. If foetuses are considered ‘viable by virtue of technology’ earlier in a pregnancy, this could diminish the emphasis placed on the timing of delivery from the decision-making process that obstetricians evoke when considering bringing a high-risk pregnancy to an end. With the concern about foetal viability increasingly removed from the equation, and because lower levels of risk that signal the need for intervention are likely to occur earlier in pregnancy, there could not only be an increase in premature endings to pregnancy, but these terminations could be more ‘premature’. There might be attempts to transfer foetuses to artificial wombs very early in gestation (18 weeks), but also more routine attempts to end pregnancies closer to the threshold of viability (22-24 weeks) as opposed to continuing and monitoring the pregnancy to ensure delivery is as far along as possible.”³¹

E.C. Romanis continues: “Finally, if artificial wombs were a reliable alternative to pregnancy a demand might emerge for endings to pregnancy (in favour of ex utero gestation) in less urgent or in non-medical circumstances. Pregnant people whose pregnancies pose a lesser risk to health may request to opt for an alternative to their gestation. Unpleasant or uncomfortable, but not actively dangerous, experiences during pregnancy might encourage pregnant people to seek termination in favour of artificial wombs. Unrelenting morning sickness, mobility issues and swollen limbs, migraines, insomnia, anxiety, fear of developing post-partum depression and plenty of other side effects can be difficult to endure for some pregnant people.”³² In *Equal Opportunity and the Case for State Sponsored Ectogenesis* (2015), Evie Kendal suggests that there may also be pregnant women who seek termination to escape the associated social stigma. For example, those who are concerned about the impact on their work and potential discrimination or who are struggling with addiction³³.

Therefore, while complete ectogenesis does not currently have a legal framework for its emergence, partial ectogenesis is on the verge of breaking into our advanced societies and in the medium term could pave the way for its complete version. As we can see from the debate on surrogacy, gestation is a taboo. E.C. Romanis raises these points in her rich essay, and no doubt we will see polarised debates around the perspectives opened by partial ectogenesis, as well as a wide range of literature on the ethical-legal, philosophical, religious and moral appreciations that accompany it.

Notes

1. Elizabeth Chloe Romanis, "Regulating the 'Brave New World': Ethico-Legal Implications of the Quest for Partial Ectogenesis", PhD in Bioethics/Medical Jurisprudence, the University of Manchester, 2020. Online at: <https://www.escholar.manchester.ac.uk/uk-ac-man-scw:326419>
2. See <https://perinatallifesupport.eu/>
3. Evie Kendal, *Equal Opportunity and the Case for State Sponsored Ectogenesis*, Palgrave, 2015, quoted by E.C. Romanis.
4. *Ibid.*
5. *Ibid.*
6. Philip Bal, *Unnatural: The Heretic Idea of Making People*, The Bodley Head, London, 2011.
7. *Ibid.*
8. "Let the semen of a man putrefy by itself in a sealed cucurbit with the highest putrefaction of the venter equinus [horse manure] for forty days, or until it begins at last to live, move, and be agitated, which can easily be seen... If now, after this, it be everyday nourished and fed cautiously and prudently with [an] arcanum of human blood... it becomes, thenceforth, a true and living infant, having all the members of a child that is born from a woman, but much smaller." Quoted in Ball, P., *The Devil's Doctor: Paracelsus and the World of Renaissance and Magic*. New York: Farrar, Straus and Giroux, 2006.
9. *Ibid.*
10. Jābir Ibn Hayyān, *Dix traités d'alchimie : Les dix premiers Traités du Livre des Soixante-dix*, Actes Sud, 1999.
11. In his November 1677 letter to the Royal Society, "de Natis e semine genital Animalculis".
12. "Epigenesis and Preformationism" (2005), Stanford Encyclopedia of Philosophy, Fall 2008 edition. Online at: <http://plato.stanford.edu/archives/fall2008/entries/epigenesis/>
13. Under the pseudonym of Dalenpatius, François de Plantade announces (in Latin, because his letter "contains a subject which cannot be treated in French") to have observed the "metamorphosis" of an "animalcule" which gets rid of its cuticle and appears as a "human body", soon dead, but endowed with all the vital organs, even if it is too small for its sex to be recognized. François de Plantade, « Extrait d'une lettre de M. Dalenpatius à l'auteur de ces Nouvelles, contenant une découverte curieuse, faite par le moyen du microscope », in *Nouvelles de la République des lettres*, May 1699, pp. 552-554.
14. Its members include Dora and Bertrand Russell, C.K. Ogden, Francis Darwin and John Maynard Keynes. Virginia Woolf, Lytton Strachey, Rupert Brooke, G. E. Moore, George Bernard Shaw, Rebecca West, Eileen Power, Roger Fry and Ludwig Wittgenstein are just a few of the many authors who submitted articles to *Heretics* between 1909 and 1932.
15. John Burdon Sanderson Haldane, *Daedalus, or Science and the Future*, 1923. Online at: <https://www.marxists.org/archive/haldane/works/1920s/daedalus.htm>
16. "Mr. Haldane's *Daedalus* has set forth an attractive picture of the future as it may become through the use of scientific discoveries to promote human happiness. Much as I should like to agree with his forecast, a long experience of statesmen and government has made me somewhat sceptical. I am compelled to fear that science will be used to promote the power of dominant groups, rather than to make men happy. Icarus, having been taught to fly by his father Daedalus, was destroyed by his rashness. I fear that the same fate may overtake the populations whom modern men of science have taught to fly."

- In Bertrand Russell, *Icarus or The Future of Science*, 1924. Online at: <https://www.marxists.org/reference/subject/philosophy/works/en/russell2.htm>
17. Dora Russell, *Hypatia or Woman and Knowledge*, 1925. Online at: <https://archive.org/details/in.ernet.dli.2015.108394/page/n7/mode/2up>
 18. Charlotte Haldane, *Man's World*, Chatto and Windus, 1926.
 19. *Ibid.*
 20. Allegra Hartley, "Mothers in a Man's World: Masculinity, maternity and science in Charlotte Haldane's interwar fiction", Doctoral thesis, University of Huddersfield, 2018.
 21. Vera Brittain, *Halcyon, or the Future of Monogamy*, To-day and To-morrow, 1929.
 22. Vera Brittain, *Halcyon, or the Future of Monogamy*, To-day and To-morrow, 1929, p.76. Quoted in Aline Ferreira, 'The Sexual Politics of Ectogenesis in the To-day and To-morrow Series', *Interdisciplinary Science Reviews*, Vol. 34 No. 1, March 2009.
 23. *Ibid.*
 24. See: <https://www.inserm.fr/actualite/recherche-sur-embryon-pratique-necessaire-et-bien-encadree-en-france/>
 25. Zeng Weijun, Zhao Zhenying, Yang Yuchen, Zhou Minchao, Wang Bidou, Sun Haixuan. "Design and experiment of online monitoring system for long-term culture of embryo." *Journal of Biomedical Engineering*, 2021, 38(6): 1134-1143.
 26. Marie Mandy in discussion with Henri Atlan in the radio programme "L'utérus artificiel", La Tête au Carré, France Inter, 4 April 2011. <https://www.franceinter.fr/emissions/la-tete-au-carre/la-tete-au-carre-04-avril-2011>
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 28. *Ibid.*
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Normal People's Normal Pain - an objection from the margins

By **Nazila Ghavami Kivi**

This essay is a story about what happens when the patient is no standard patient. No standard human. It is about what happens in and with the deviants. With the dissidents. It is an objection, a retaliation on behalf of those bodies marginalised by words, the pain of those bodies pushed to the margins of language. Those who are made strangers in their own bodies. Those who expose a problem but realise that they, themselves, are made to pose a problem. I, myself, come from a scientific background, from medical studies over public health science and cultural studies. I am drawing from the scientific work of both myself and others, but I am not writing science here, I have a stake in this myself. This essay is an autoethnographic work, a retaliation and an analysis in one.

First words first

Who decides what pain is? Who decides how pain should be voiced? Do words create pain?

Is my former supervisor in social medicine right when she states that pain depends on language in order to exist, to be real? She says, for example, that in French, liver pain is considered a thing, while in Denmark, it would hardly ever happen that anyone would speak of such a pain. Language affects what we are able to feel, it creates narratives around and makes sense of our bodily sensations.

In my Social Media community of what we ourselves have come to call *endometriosis warriors*, the doctor's questionnaire about pain is a running joke. 'How much does it hurt from a scale from 1-10' is an entirely useless question when the answer would be somewhere in between five hundred and one thousand. This scale of pain seems meaningless in relation to chronic or

recurring pain, but nevertheless it is the standard tool put to use when a doctor is determining how much a patient hurts. But what, then, happens when one's pain reply is not accepted? What happens if one does not have that which health researchers call *Cultural Health Capital*?

This is a notion that builds upon that which the sociologist Pierre Bourdieu calls cultural, social and economical capital. To have cultural health capital is about being able to understand and make oneself understood via the medical language, it is about having the ability and the overview to navigate the medical health sector, it is about being able to identify where to ask for help, about having the courage to ask for this help, and about trusting that, indeed, help will come when one asks for it. It is an important, but also entirely overlooked detail that when potential patients do not trust the health care system, they are less likely to seek help there. This may mean that they are left with untreated diseases, or seek alternatives where there is more care to find. Lack of trust in the health system can result from former experiences of being met with prejudices, or of not being taken seriously. In addition, cultural health capital can also be about other factors such as the ability of the doctor to recognize themselves in the patient, hereby showing more or less empathy.

A patient can have or show some attributes that make them more or less acceptable as a patient. Mastering the state language, using the right words to describe one's symptoms, dressing according to respectability standards of society and being read as recognizably middle class. Patients are also expected to display dignified behaviour, which means that yelling or sighing too loudly is seen as too dramatic, but even being too stoic is not well received. When one is in the Western health care system, it is important to show pain in the

right way in order to receive help. And it is important to acknowledge the authority of the doctor. One may have acquired some knowledge about one's disease, but it is important to not be too knowledgeable, to not have googled too much in order to not tip the power balance between doctor and patient. One has to stay in her place, so to say.

To use the words of health sociologist Talcott Parsons, one must accept one's so-called 'sick role', defined by Parsons as a kind of deviation sanctioned by society that allows the sick person to opt out of the demands of productivity, at least for a while. In order to do so without challenging the system of production, the sick person must in turn accept regulation through rights and duties. The sick person has a right to not work, to rest and to dwell outside of the normal rhythms of society. But the sick person also has a duty to want a cure, to seek the newest technological advances and to cooperate with health authorities. This contract demands that the patient accepts the authority of the doctor and accepts the rights and duties of a sick person.

Ethnic pain

It takes a man to be a patient. Maybe quite literally so, if we look at the fact that historically, modern health science is created around an average, middle class, fairly well-educated and white male patient. The standard man. The standard human.

A number of people working within the intersections of health science and the humanities, including myself, have criticised the theory of cultural health capital for having too much focus on what the patient should do. On the responsibility of the patient to not just do something in particular, but to be something or someone in particular. If the patient somehow reacts 'inappropriately' in the eyes of the health system, it can prove difficult for the health personnel to navigate this encounter, because they, themselves, are informed by the preconceived ideas that govern society at large.

An example is that which is called 'ethnic pain'. This, of course, is not an official concept in the Danish health sector, but anyone who has been part of the healthcare system knows that sometimes, a slip of the tongue happens, and someone's pain will be characterised as 'ethnic pain'. But what does this concept entail? Ethnic pain is put to use when a patient's pain is perceived as not quite real by health professionals. They may think that the patient is exaggerating their pain. Perhaps the patient is expressing pain in a way that they are not able to recognize, which makes them unsure of their own authority. Perhaps there are no ICD-10-codes or recognized figures for this kind of pain. Hence the pain turns 'ethnic'. The pain becomes exoticized, strange. The greek word ΕΞΩΤΙΚΟΣ (*exotikos*) means stranger or that which comes from elsewhere. And within medical science, when a phenomena is regarded as strange, historically it has been exposed to both

ridicule and marginalisation. Medical science is not equipped to handle phenomena for which no diagnosis exists. Or put differently: where no diagnosis exists, no illness exists. And what is then left? Something must be wrong with the patient, something psychological, perhaps psychosomatic. Perhaps the patient is hysterical, or displays 'ethnic pain'? History shows that the diagnosis hysteria has been given to women, whom today would have been diagnosed with various autoimmune diseases. I have interviewed women with endometriosis who have been called hysterical when they have confided in their doctor about their pain.

Not recognised, try again

Recent years have brought increased attention to the fact that people of colour tend to receive suboptimal treatments within healthcare systems. For example, a U.S. survey showed that health personnel were less likely to offer black children pain relief than white children. A great deal of research shows that within the psychiatric system, people of colour are more likely to be seen as sick before anything else, while white people are given the advantage of being seen as humans with certain life circumstances that make them sick. This phenomenon is called decontextualization of the patient. I have seen how certain factors such as gender, race and class in many ways affect people's experiences within the health system, and I have come to realise that the term 'ethnic pain' has a lot in common with the notion of hysteria.

The two concepts are related, because gender and race are interrelated myths, co-constructed and inseparable from each other – especially from a historical perspective on how race and gender were 'invented' when a burgeoning capitalist system was in need of free labour. And this is where pain enters the picture. A crucial step in reducing someone to a means for production and profit is taking their humanity from them. In the colonies, enslaved people were whipped extra hard, not 'just' because they were seen as lazy, but because it was presupposed that they were not able to feel pain in the same way as 'real' people, as white people. A similar logic was used by the doctor James Marion Sims, today recognized as the father of modern gynaecology. His goal – to find a cure for vaginal fistula – was reached by experimenting on enslaved women, whom he had bought, and who received no anaesthetics or pain relief during the surgical experiments he performed on them.

In 2011, researcher of psychology Paolo Riva and colleagues found that test persons read pain more intensely in male faces, compared to female faces regardless of the gender of the test person. This bias is unconscious, which means both layman and health professionals potentially discriminate based on the patient's gender.

Hysteria re-appearing under disguise

Most people have heard about PMS, premenstrual syndrome, but many do not know that DSM-5, which is the statistical handbook of the U.S. psychiatry association, has added a psychiatric diagnosis more severe than PMS with the name PMDS, premenstrual dysphoric syndrome. PMDS is treated with antidepressants. The diagnosis remains deeply controversial, and critics state that it adds to the pathologization of women. From a feminist point of view, several of the symptoms seems to mirror conventional characteristics of femininity, such as mood swings, irritability, a lack of interest in daily activities (care work?) and certain food cravings.

This brings us back to deviation and the concept of normality. In many ways, the definition of the 'healthy' woman is presented through the definition of the sick woman: The sick woman is uninterested in daily activities (normal productivity and care work), she is angry, irritable and she eats whatever she wants. The not-ill, normal and good woman becomes the opposite of this sick woman. The *good* woman does not show anger, she is not irritated, she manages her appetite and cares for her surroundings as the good labourer of reproductive work that she is.

And now let's turn to the beginning: the sick role. Who is entitled to pain? What kind of pain is legitimate? Menstruation diagnosis, hysteria, ethnic pain, each in their own way define the normal through a designation of the sick. This normal does not take into consideration that pain can be dependent on language, that one's ability to perform the role of the patient will be judged by others. The medical sciences have yet to make space for the many different expressions of pain that are currently not accepted or not understood by the health system. Perhaps, once the stigmatising notion of ethnic pain is gone, we can start to unlearn the colonial hierarchy that still prevails. As it stands now, too many of us are placed within the margins of *humanity*, not properly understood, ignored, under- and mistreated by a medical science whose language favours him, the standard man.

Methodology,

ART4MED's methodological framework contributes to the collaborative efforts between artists and health and biomedical researchers. As such, it offers a crossover between European cultural and research frameworks with a focus on art-driven innovation. It is based on the Collaboration toolkit developed through S+T+ARTS projects, some interdisciplinary residencies from the last five years, and the Open Source Hardware framework developed through the ongoing OpenNext project.

By **Miha Turšič**

On the fundamental level, ART4MED's methodological framework defines the **collaboration, point of departure and targeted goals** of the residency. Based on that, collaborators outline the Residency Journey, which functions as an overview of **resources, activities and tactics** required through the various phases of research or innovation efforts. This outline also serves as a **shared overview of planned activities** ready to be adapted as the residency develops, while pointing out **pathways of specific residencies** and the more **particular needs** of each residency.

At the beginning of the project, all residencies filled out the Residency Journey canvas, which gave all the

participants better clarity on capacities, intentions, and required tasks, as well as a common tool among themselves. In some cases, the outline also quickly showed weaknesses in their plans, which led to new strategies. With the scope of the framework, it became clear that some collaborations are more concrete and focused on specific steps, some needed more research and exploration, while others were focused primarily on prototyping and production.

Methodological case study of each residency:

Waag Futurelab residency journey focused on Adriana Knouf's collaboration with medical research partners. However, due to pandemic restrictions, research partners were not able to provide needed access to the labs, which led to a change in strategy. Given Waag's capacities, Knouf opted for a feminist-based writing workshop. In line with Waag's public research agenda, this format became participatory engagement with the audience, with whom Knouf collected and exchanged insights. In addition to this format, Knouf developed a final performance at Waag's Theatrum Anatomicum, channelling its long tradition of the open study of human bodies.

Bioart Society residency journey focused on the collaboration between Emilia Tikka and Sami reindeer herders. Through remote and in-person meetings, they established a level of shared understanding that led to sound recording experiments, biolab experiments and the development of two narrative works from which two films were produced.

Labae residency journey focused more on curatorial practice as practice of care, with the intention to establish a space for healing and reparative epistemologies that don't have a place in normative healthcare institutions. Labae started introducing their topic through an exhibition that explored these themes through artworks, immersive installations, performances, workshops and talks aiming to renegotiate the hospital as a space of care via artistic and collaborative methodologies. The programme first hosted Luisa Prado and Edna Bonhomme with their sound installations, and in the next phase introduced the practice of Nazilia Kivi, who organised writing workshops. In this way, more artists were introduced, all contributing to the shared agenda of establishing the space with a curated art programme.

Kersnikova residency journey started with an open call for artists, from which Helena Nikonole & Lucy Ojomoko were selected. Due to their residency in Russia, the initial research part of the residency was realised via biweekly remote meetings. When finally possible, they travelled to Ljubljana to finalise research and start artwork production. With initial research done at Moscow genome research lab, another associated research partner joined them in producing the artwork in Ljubljana. They presented their proof-of-concept at the final exhibition.

Art2M residency journey built on a previous version of Shu Lea Cheang's artwork, mainly focusing on still needed material research, moulding and casting techniques, and the development of web platforms. All three contributed to the production of a new version of the artwork that was presented at the final festival.

Visual overview:

https://miro.com/app/board/o9J_lWcRv2l=?move-ToWidget=3458764527914020903&cot=14

Each residency was involved in a different way at different steps of the journey. For most, residencies were the beginning of the collaboration, except in the case of Chang's work, which had a previous version that was improved throughout the residency. Some incorporated more input from others, such as Knouf's writing workshops, LABAE's exhibition as a public discussion starter, and Kersnikova's open call for artists. Most of the residencies focused primarily on experimentation and identifying the potential of their collaborations, aimed at acquiring the practical knowledge needed to produce final artworks. Knouf's work remained in the format of a writing workshop, while improving it throughout a number of workshops at Waag, her teaching, and other events. In a similar way, Nazilia Kivi engaged with the public through writing workshops where they gained essential feedback on the topic of the residency. Emilia Tikka performed her research at her residency in Kilpisjärvi and in a biotech laboratory. Nikonole and Ojomoko conducted initial research in a Moscow lab and performed the final work with an additional research partner in Ljubljana. Chang's main work was experimenting with materials, moulding and casting techniques, where she collaborated with several expert teams. All residencies concluded with produced artworks, whether as performances, installations, films or publications.

However, despite successful finalizations, all residencies also experienced numerous issues that needed to be resolved. The collaboration between Waag and Knouf failed in providing the necessary biotech partners and facilities, but found a solution in collaborating with a non-human partner, lichens. LABAE's collaboration with the first two artists ended after the first phase due to schedule-related reasons, which required LABAE to invite another artist into the effort. Bioart Society's residency experienced difficulties in defining the roles and rights of collaborators as the project developed along the way, but all issues could be resolved to everybody's satisfaction. Kersnikova, on the other hand, experienced severe travel restrictions between Russia and Slovenia, first due to pandemic restrictions, and last year due to a war. The Art2M residency experienced issues related to the mixed roles of involved collaborators with shifting responsibilities and rights. All these issues demonstrate very delicate relationships among collaborators.

Residencies,

1/ Xenological Preterrelations

A personal investigation into xenology and the possibilities of transformation-from-within

By **Adriana Knouf**, Artist and PhD
Producing partner: **Waag Futurelab**

Adriana Knouf's work engages with the concept of "xenology": the study, analysis, and development of the xeno (strange, alien, other). This research begins by being rooted in a particular xeno element of herself, being transgender. Nevertheless, the practices extend far beyond limited identity formations and suggest avenues of (self-)experimentation that open all to the possibilities of transformation-from-within.

Her project continues from earlier work that she did at Kersnikova Institute and Kapelica Gallery during a Biofriction Residency. That project, Xenological Entanglements. 001: Eromatase is a multi-year work that aims to genetically engineer the production of estrogen from testicular cells. This desire is rooted not only in everyday convenience and the rebuke of medical gatekeeping, but also in a deeper longing to go on long-duration space missions, which would require some kind of pharmaceutical self-sufficiency. As a result, the project also necessitates the development of open source tools of space-based biomedicine, such as microgravity simulators.

She plans on deeply engaging with at least two aspects of this project: the use of CRISPRa technologies to activate the aromatase gene in testicular cells (and thus catalyse the transformation of testosterone into estradiol in those cells), and the possible genetic transmutation of these mechanisms into commensal skin fungi such as *Malassezia*, so as to provide a ready

source for transdermal absorption of estradiol.

Building on this, and in conjunction with Waag, Hackers and Designers, and the ecotoxicologist Heather Leslie, she plans on more deeply exploring the notions of commensality, specifically how we define what is "toxic", "poison", "foreign", "xeno", and thus what is outside of the realm of the commensal. What would it mean to adjust the valence of these terms so that their poisons become cures – the pharmakon? What sorts of new relations could we form with these entities – preterrelations, relations "beyond" the conventional? Relationships are fundamentally about encounters between unlike entities, the difference that necessitates a form of mediation between them. Thus, how we live our relationships with other entities (bio-, silico-, algo-, cosmo-) will shape the types of worlds we want to build, an urgent consideration at a time when self-same identity too often triumphs over difference.

ARTISTIC TEAM

Adriana Knouf

Adriana Knouf, Ph.D. works as an artist, writer, and xenologist. She engages with topics such as wet media, space art, satellites, radio transmission, non-human encounters, drone flight, queer and trans futurities, machine learning, the voice, and papermaking. She is the Founding Facilitator of the tranxxeno lab, a nomadic artistic research laboratory that promotes entanglements amongst trans and xeno entities. Adriana is formerly an Assistant Professor of Art + Design at Northeastern University in Boston, USA, previously taught at Wellesley College and Ithaca College, and is currently a Practice Tutor at St Jost School of Art and Design. Adriana is based in Amsterdam, the Netherlands. Adriana has been selected for a number of prestigious residencies, including an Art4Med/3Package Deal residency at Waag in Amsterdam; a Biofriction residency at Kapelica Gallery and Kersnikova Institute in Ljubljana, Slovenia; participation in Field_Notes supported by the Bioart Society, Helsinki, Finland; and a project at the Wave Farm in Acra, NY, USA. Adriana has a PhD in Information Science from Cornell University, an SM in Media Arts and Sciences from the Massachusetts Institute of Technology, and a BS in Engineering and Applied Science from the California Institute of Technology.

RESEARCH PARTNER

Waag Futurelab

Founded in 1994, Waag operates at the intersection of science, technology and the arts. Waag focuses on emergent technologies as instruments for social change, and is guided by the values of fairness, openness and inclusivity. Waag's dedicated team of 60 thinkers and makers empowers people to become active citizens through technology. Waag uses the method of Public Research: experimental, interdisciplinary research. Artists, creatives and end-users have a central position and a large influence on the final result: Users-as-Designers. The classic approach of science and the standard model of research and development is enhanced by this method that cross-links arts, culture and science. Public Research creates applications suited to the needs and possibilities of users and is related to participatory design, rapid prototyping, practice-based research and tinkering. With its long-time international experience in community building and managing innovative projects, Waag has developed several ground-breaking prototypes, applications in (inter)national projects and programs. Labs, challenges and academies are a few of the successful strategies that Waag uses to engage a wide range of stakeholders with technology that can benefit societal issues, such as healthy ageing, digital heritage, educational reform, open design, development of internet technologies, and even genomics.

2/ MNEMONIA

Memories of the birds

A speculation of (epigenetic) interspecies memories between humans, reindeer and landscape

By **Emilia Tikka**, Transdisciplinary Designer and PhD Candidate
Oula A Valkeapää, Reindeer herder and Artist
Leena Valkeapää, Artist and Doctor of Arts
Producing partner: **Bioart Society**

This project consulted various scientists, including in genetics and epigenetics of migration (Professor Miriam Liedvogel, Institute of Avian Research (IAR) Germany, transgenerational epigenetic inheritance of memories (Professor Oded Rechavi Lab) Israel, arctic climate research and AMOC, Gulf stream collapse (Niklas Boers, Potsdam Institute of Climate Impact research) Germany, amongst others.

The film crew in addition to Oula A, Leena and Emilia:

Eduardo Mattos (DoP, editing), Niklas Eurèn (sound recording), Ossi Oikari (sound design).

Co-making stories

In the early stages of the project, Oula A. and Leena Valkeapää joined Emilia Tikka as collaboration partners. The main process of the collaboration took place online, including discussions via video conference, sharing thoughts and ideas through messages, and shared online documents. The partners also met in person in June 2021 when Emilia was an artist in residence at the Kilpisjärvi Biological Station. Other meetings in person included a sound recording session in October 2021 and a film production in April 2022. The project

started with sharing thoughts and ideas based on the varying expertise and interests of the collaboration partners. The first goal of the project was to find a way to develop an idea that would be rising from shared knowledge of the partners. The process required time, gaining trust, and listening and learning from each other. The second central goal was to find a practice of co-storytelling in a way that both parties would become part of the active making process. The central format of the work became storytelling through film, where the partners would work together, and Oula would direct one of the films and Emilia the other. The aim of the

project was to tell stories that would not only function as a critique of the present day but also as a speculative proposition of an alternative future. Their shared interest was to raise questions regarding humans' shifting relationship with nature, Oula through human-reindeer relations, and Emilia through discourses of advanced biomedicine. The goal was to find a way to address these questions through storytelling beyond binaries of nostalgic nature vs. human-centred bio-scientific progress. The aim was to situate questions of (epi)genetic heredity and futures of the human condition into *thinking-with* human-reindeer relations in the changing environment of the Arctic.

Mnemonia I-III

Following initial discussions, Oula's thoughts about his relationship with reindeer and by extension with the environment became the central focus of the project. The discussions touched upon the symbiotic relationship between the herder and the reindeer, as well as their possible co-evolution, how deeply both species might have influenced and learned from each other, and how a herder must learn to perceive the environment through the reindeer's perspective in order to live with them. The project positions the questions in Oula's everyday practice with his reindeer, focusing on how the human-reindeer relations have changed, and is still changing as the ancient nomadic practice becomes more sedentary. The research and discussions at this point focused on questions such as: What disappears when the migratory movement vanishes through a complex mixture of issues including technology, borders, and environmental changes? What happens to the deep connection between humans and reindeer when the migratory movement stops? The first film *Mnemonia I* is a poetic non-linear story of Oula's contemporary life as a herder on the verge of this drastic change. Drawing from Johan Turi's metaphor of migrating humans and reindeer as birds, the first production of the project was an autobiographical film shot by Oula, during the summer of 2021.

When the project proceeded towards the production of the second story and thinking of futures, it had two central aims. First, a wish to imagine hopeful futures – not as something necessarily better, but rather to 'unsettle' the current development. The second aim was to break the idea of the future as linear to the present. Oula's contemporary life with the reindeer is deeply connected to the past. Therefore the future could not be perceived as something linear, nor circular, but rather as something malleable and in constant change.

Considering human-reindeer relations as being deeply connected to shared life in migration, the biomedical research first focused on epigenetics and genetics of animal migration, how environmental conditions and other species deeply influence migratory behaviour. Within this framework, migration was seen as a way of *dwelling, becoming with* the environment, culturally,

philosophically, and biologically. The central idea of the work became to read migratory co-existing in the environment as a kind of *shared memory* between species, inherited traces between the humans, the land, and the reindeer. When imagining futures through the shared histories of humans and migrating reindeer, the partners were looking at transgenerational epigenetic inheritance as a posthuman approach. The aim was to speculate how epigenetic memories could be shared as an interspecies concept through the centuries-old connection between migrating reindeer, land and humans. The concept also proposes an alternative perspective related to the human-centred DNA-based concept of heredity, by asking: what if other living things we are *living with* also carry our embodied memories? The second part of the project situates this concept in the year 2102, in a world that follows an ecological collapse. *Mnemonia II* is a story about a scientist who discovers that an ancient reindeer carries the epigenetic memories of her ancestors. The film was directed by Emilia during the spring of 2022.

Mnemonia III tells a story of an alternative future as speculative objects from 2152. A circular book is an introduction to mnemonic bioscience, a fictional field of research focusing on interspecies epigenetic memories. *A biometric passport* offers a glimpse of the world with a posthuman border system based on interspecies ancestry, designed to follow the natural migration routes of reindeer. *A reindeer transport harness* refers to a return of a nomadic reindeer herding culture.

Project outcomes

One of the main outcomes of the project was the collaboration itself. Within the process, the partners became collaborating artists developing and telling stories together. The resulting artwork takes the form of an installation with two films and objects, moving between different temporalities, between fiction and non-fiction. In all the stories, a reindeer functions as a link between humans and the environment, humans and nature.

The first story illustrates the present-day reindeer herding culture, where the ancient nomadic culture, based on migration, is on the verge of vanishing. What happens to the shared histories when the bond between herder and reindeer changes? The second story explores an imaginary future, where the epigenetics of an ancient reindeer enable humans to remember and re-connect. The third dimension goes beyond the critique of the present, and imagines an alternative world through objects. The outcome does not separate bioscience and nature-based cosmologies, but rather aims to present them as a mode of co-existence. The story proposes a possibility of hope in the ruins and a new kind of human condition in relation to nature.

3/ Quorum Sensing: Skin Flora Signal System

Human skin microbiome gene modifications and disease detection through smell

By **Helena Nikonole**, Artist
Lucy Ojomoko, Artist & Scientific Researcher
Kristijan Tkalec, Scientific researcher
(Kersnikova Institute, BioTehna Laboratory)
Producing partner: **Kersnikova Institute**

Kersnikova Institute opted to publish an international open call for a residency project that would help map out art practices, projects and individuals, which may have eluded our radar thus far. We saw this open call as a way to identify best practices, and to communicate and disseminate information about the ART4MED project to a wider audience. The response to the open call was overwhelming, as more than 50 project proposals were received and evaluated by the project team, consisting of art curators, producers, technicians, and scientists. The most impressive five projects were shortlisted, and the final selection was determined

according to the project's optimal suitability to the ART4MED objectives and Kersnikova Institute's production capacities.

The proposal that perfectly fit the above mentioned objectives and capacities was "Quorum Sensing: Skin Flora Signal System" by the Russian artist Helena Nikonole and her scientific collaborator Lucy Ojomoko. The project focused on genetically modifying human skin microbiome bacteria to an extent where they would produce smells of flowers as a response to a trigger such as a disease or fever.

ARTISTIC TEAM

Emilia Tikka

Emilia Tikka is a transdisciplinary designer and researcher. She is currently a Ph.D. candidate at Aalto University in Helsinki. Former affiliations include: visiting scholar position at the Hermann von Helmholtz Centre for Cultural Techniques of the Humboldt-Universität zu Berlin, artist in residence at CRISPR laboratories of Max-Delbrück-Centre for Molecular Medicine in Berlin, and various other art and science residencies. Her work explores philosophical dimensions and cultural implications of novel biomedicine focusing on genetics and epigenetics in relation to the human condition. Her current research and writing focus on investigating human-nature-technology relations in technoscientific discourse. Her practice combines film, lab experiments, and speculative design – aiming to generate alternative modes of knowledge production in technoscientific cultures. Her ongoing Ph.D. research is funded by the Finnish Kone Foundation. Her art and design works have been exhibited at Ars Electronica in Austria, New York University Arts Center in the United Arab Emirates, Gregg Museum for Art and Design in the USA, Imagine Science Film Festival NYC in the USA, STATE Studio in Germany, EMMA Museum of Modern Art in Finland, and Tekniska Museet in Sweden, among others.

Oula A. and Leena Valkeapää

Oula A. Valkeapää lives with reindeers in the Sami reindeer herding tradition. Leena Valkeapää is an artist and researcher with a Doctor in Arts. She has exhibited as a visual artist since 1988 and has produced several public environmental artworks. Currently, she also works as a mentor at the Ars Bioartica Residency program in Kilpisjärvi, Finland. Since 2011, Oula A. and Leena Valkeapää work together to produce internationally recognized art and research-driven projects. Thematics of their collaborative works include natural phenomena, local reindeer herding practices, and situated environmental questions.

RESEARCH PARTNER

Bioart Society

Bioart Society is a Helsinki-based association developing, producing, and facilitating activities around art and natural sciences with an emphasis on biology, ecology, and life sciences. It runs SOLU Space, an artistic laboratory and platform for art, science, and society in Katajanokka, Helsinki, and, together with the Kilpisjärvi Biological Station of the University of Helsinki, Ars Bioartica, an art&science program with a focus on the sub-arctic environment. Bioart Society was established in May 2008 and currently has over 130 members from Finland and other countries. Bioart Society aims to develop the current potential of the art&science field in response to the need for more professionals and initiatives interested in art&science work, and to create a dialogue with the public at large. Bioart Society encourages work located at the intersection of art, science, and society to leave its comfort zone, push boundaries, and cross borders to become what we can't possibly know. Bioart Society seeks the frontiers of art and extends the practices of artists engaging with scientific processes, facilities, and technologies, in order to participate in, reveal and illuminate the social, political, and cultural context that brought them into being.

“The human skin microbiome is a complex set of bacteria and viruses, living in symbiotic relationships with our body. It can be seen as an interfacial biological phenomenon; an operating system between the human body and the environment. On various levels, this structure possesses properties of different biological objects, such as a colony of cells, an organ, or an organism.

Surface phenomena at the phase boundary are extremely complex systems on a microscopic scale, that turn the lines of contact into a new meta organ with its own laws, capable of operating with its own language, and giving rise to a new suprasystem.

By creating genetically modified skin microbiome bacteria, which produce smells of flowers in response to a trigger such as a disease or fever, the project “Quorum Sensing: Skin Flora Signal System” suggests considering the skin microbiome as a terminal or an interface.

On a bio-semiotic level, this signal system may be resurrected and reimagined by programming and reprogramming existing biological relations and structures in the human body into an artificially created, but nevertheless natural organ, operating between molecular-level processes and something tangible like a smell.

Some diseases are asymptomatic, but can be detected on a molecular level. The entity or the organ, created as a prototype, is able to reveal diseases by decoding these molecular processes and producing smells which can be detected and identified. In terms of medicine, this system can be considered as a method of diagnostics and self-diagnostics for disease perception and even prevention. However, we can expand this understanding in terms of bio-semiotics to see it as a new sensing organ with the specific ability to redefine the existing signalling system (smells) and to use a familiar sensation (olfactory) to encode and decode the information on a biochemical level.” (Helena Nikonole, Lucy Ojomoko, Jurij Krpan; project description).

The project also touched upon and addressed, not only relations between artists and art-production platforms, but also relations and cooperation between various profiles of individuals involved in the project and a variety of institutions and companies that catalysed cross-fertilization and sharing of knowledge. The selected artist and collaborator also gained insight into new methods and fields of creating and experimenting, as Kersnikova Institute provided them with a new approach to investigating health and medicine, with resources formerly beyond their experience.

The plan for the residency project was to carry out a majority of the residency remotely beginning in March 2021, predominantly due to COVID restrictions, but also due to the fact that the production phase of the project ran almost through the entirety of the residency, and it would not be feasible on site at Kersnikova Institute and BioTehna laboratory. A portion of the residency would be executed in Slovenia with both Helena and Lucy travelling to Ljubljana to conclude the residency. As Helena and Lucy were both living in Moscow, and as Lucy worked at the Genome Engineering Lab, Kersnikova Institute was able to support and manage the residency remotely, while the artist and the scientific collaborator had access to critical infrastructure, enabling them to carry out the research phases of the project.

The physical part of the residency in Ljubljana was realised in November 2021. Here the aim was to finalise the research and artwork production and to showcase the artwork, in combination with accompanying project activities, such as a public presentation.

In Ljubljana, the artists used Kersnikova Institute's facilities (BioTehna Laboratory, Vivarium Laboratory and RAMPA Lab) as their workspace/studio, working with the project team on technical solutions, while the bulk of their genome engineering laboratory work was done at the Infrastructural Centre Mycosmo (University of Ljubljana, Biotechnical Faculty), who joined the project as associated research partner in the latter stages of the project development, and contributed to the project with space, materials and personnel.

The team assembled around the artists was extremely multidisciplinary, as it consisted of curators and producers, technicians, artists, scientists, makers, developers and manufacturers. While BioTehna's biotechnologist Kristijan Tkalec assisted Helena and Lucy with laboratory protocols and other lab work, Kersnikova's DIY/DITO community of mentors and developers joined the team to help with 3D modelling and printing exhibition elements, as well as technological and programming solutions for bioreactors, pumps and controllers for the installation. In addition, we involved a local manufacturer of laboratory glassware with whom Helena and Lucy

had co-working sessions to produce various glassware suitable for artistic presentation of the microbes they were engineering.

At the end of the residency, the project was showcased at Kersnikova Institute in the form of an intermedia installation, accompanied by a presentation of the project by the artists to the attending audience. The installation itself was (due to restrictions in genetically modified organisms handling) a “proof of concept” exhibition, showcasing various elements of the project in a technically comprehensive set-up, but without the genetically modified bacteria.

The project activities had a palpable impact on all levels, as it was yet another project at Kersnikova Institute that enabled us to perform advanced research and development in the field of art, science & technology.

ARTISTIC TEAM

Helena Nikonole

Helena Nikonole is a new media artist, independent curator and educator whose field of interests embraces hybrid art, the new aesthetics, the Internet of Things, and Artificial Intelligence. In her works she explores technology's potential opportunities, risks and dangers that techno-evangelists and scientists are unable or unlikely to realise. She presents lectures and workshops in the field of Art & Science, Neural Networks in Arts and new media art at various institutions, including Rodchenko Art School (Moscow), Art Laboratory (Berlin), Mutek Festival (Montreal and Tokyo), Institute of Philosophy (Russian Academy of Sciences), Innopolis University (Innopolis), National Centre for Contemporary Arts (Moscow), and many others. As a curator, she focuses on critical approaches to technology. This includes the exhibition “Learning Machines”, which she co-curated with artist and curator Alexey Shulgin, as well as the project “Datasets VS Mindsets: Post-Soviet Explorations of the Digital Control Society” (co-curated with Olga Vad) at Ars Electronica Festival 2020.

Lucy Ojomoko

Lucy Ojomoko is a molecular biologist and artist, researcher at Lab of Gene Engineering, MIPT, BioPharm cluster. Her science and artistic research is focused on the field of synthetic and neurobiology – exploring the problem of trans-species and intraspecific communication, and studying plasticity limits of living systems for reprogramming. She was selected to participate in the 13th Young Scientists Forum 2013, FEBS Congress 2013 (Saint-Petersburg, Russia), FEBS Congress 2014 (Paris, France), and SENSE6 2013 Conference (Cambridge, UK), Perspective in Molecular Neuroscience in Health and Disease 2014 (Bochum, Germany), Basel Life Conference 2017, 2018 (Basel, Switzerland), and many others. A finalist of Singularity University and Skolkovo competition with synthetic biology

These activities and groups of people were deeply interdisciplinary, meaning that a variety of experts and professionals were involved, using precise scientific technology and approaches, but also implementing a so-called “art thinking” approach, which enables all profiles involved to reach new innovation potentials that spill over to all sides. With a quality art project at the end, and an idea that has huge potential and implications for self-diagnostics and medicine, Kersnikova put another stone in the mosaic of our endeavours in the field of contemporary investigative art that seeds out and produces collaborative projects with the industry and other sectors. In addition, we successfully brought in the DIY/DITO community of makers and mentors, who dug deep into the potentials of art projects tackling health and medicine.

project (creation of a handy-tool software for SynBio). Her scientific project was presented at a competition organised by MIT and Global Innovation Labs, Boston, USA. Awarded in a range of grant programs, including DAAD, “S.T.A.R.T.”, “Umnik”. As an artist and member of science-art group 18 apples, she was exposed to a range of exhibitions and festivals including “MetabolIA.I” at Ars Electronica 2017, “Ural Industrial Biennale of Contemporary Art” 2017, “Sub observationem” 2015, “Polytech Science festival” 2015, “Medianovation. Science-art Experiment No1/2014” 2014, “Geek Picnic” 2014, “Manifesta-10” 2014, and many others.

RESEARCH PARTNER

BioTehna Laboratory

BioTehna Laboratory is a wet-lab where artistic (and scientific) research of living systems takes place. It's a well-equipped laboratory containing high-grade clean chambers, incubators, microscopes, etc., used to investigate fascinating correlations between nature and technology. In this space, artists and scientists creatively and innovatively merge living materials with electronics, stimulating reflection and awareness of the digitalised life that awaits us in the near future. The laboratory is currently focused on working with somatic cells, as cultivating them requires a particularly careful and sterile regime that does not allow work with bacteria, microorganisms, plants and animals (although it was intended for a broader investigation of living systems until 2017).

Kristijan Tkalec

Kristijan Tkalec is a biotechnologist, as well as the coordinator and project manager at BioTehna Laboratory since 2013. He has facilitated and conducted a wide range of projects, actions and experiments, mostly in the fields of DIYbio, biotechnology, biology, biochemistry, with renowned artists such as Brendan Balengee,

Špela Petrič, Maja Smrekar, Mojca Založnik, Zoran Srdić, Angelo Vermeulen, Anna Dumitriu... He has also collaborated with DIYbio initiatives and communities such as Lab Easy, Hack-a-taq, Hackteria, Gaudilabs, etc. In the past years, he co-conceptualised, implemented and led educational programmes for children and youngsters at Kersnikova Institute (Friday Academy, Summer Academy, Open Lab, Crafty Builders) and has co-developed a series of workshops for educators and teachers in collaboration with the National Institute of Education.

Associated Research partner:
Infrastructural Centre (IC) Mycosmo
(University of Ljubljana, Biotechnical Faculty, Department of Biology, Chair for Molecular Genetics and Biology of Microorganisms).

The University of Ljubljana provides support via its Network of Research and Infrastructural Centers UL, which includes 34 infrastructural centres within 13 member faculties of UL. The main goal of the Network is to provide specialised technical, instrumental, expert and information support to research and infrastructure groups of the University of Ljubljana, its pedagogical activities, and users outside the University. As a member of the Network, the IC Mycosmo performs four interrelated core activities: microbiological collection Ex, mycology – basic and applied services and research, molecular research of adaptations to extreme conditions, and study of genomes of extremophilic fungi and dissemination of data / knowledge.

PRODUCING PARTNER

KERSNIKOVA INSTITUTE

Zavod Kersnikova (Kersnikova Institute) is a non-profit cultural organisation in Ljubljana (Slovenia) that consists of various departments, operating in the fields of culture, art, and investigative learning: Kapelica Gallery, a world renowned art space for contemporary investigative art; Rampa Lab hackerspace, where relations between society, technology and art are reconsidered and explored via non-formal education activities for children and youngsters; the inspirational laboratory BioTehna, which focuses on the artistic research of living systems, equipped with advanced biotechnical equipment; and Vivarium laboratory for investigating relations between plants, animals and technology (AI & robotics). Kersnikova Institution's team creates valuable interdisciplinary interactions between individuals and institutions in order to facilitate inspiring artworks, intense public debate and investigative learning workshops. By presenting bold projects, Kersnikova encourages contemporary and urban cultural artistic movements in which artists, scientists, engineers, researchers and experts from other fields, as well as children, youth and the general population, predict and create the future.

4/ UNBORN_{oX}9 FUTURE BABY PRODUCTION

From ultrasounds to the cyborg future of parenting and artificial wombs

By **Shu Lea Cheang**, Artist
With **Ewen Chardronnet**, **Benjamin Cadon (Labomedia)**, **Jérôme Dubois (echOpen)**, **Thomas Demmer & Quentin Perchais (Qastor)**, **Vivien Roussel (thr34d5)**, **Svar Simpson**

Online web platform concept & Interface design:
Shu Lea Cheang with programming by **Nicolas Derambure** and **Benjamin Cadon of Labomedia**

Producing partner: **ART2M/Makery**, **Antre-Peaux/UrsuLaB**, **Labomedia**, **echOpen**

Prior to the ART4MED residency, open source arduino prototyping, PD patch coding sessions, sonic workshops, reading groups, interviews, and improvised performances were held following research studies in ultrasonic intervention, development of fetuses in artificial wombs outside of the body and surrogacy childbearing.

Fetal Phantoms

Starting in 2016, as they worked on the ultrasound sonic echOpen fork, the team of Future Baby Production was confronted with the world of "fetal phantoms" – devices that schools of obstetricians and sonographers use to practise on. These devices provide a complete fetal model suspended in a non-echogenic amniotic fluid environment for high-quality, realistic imaging for 2D and 3D ultrasound applications. The general aesthetics of these devices, involving models of ultra-realistic newborns, elicits a strange vision, somewhere between the artificial uterus of science-fiction and the stillborn

baby. The unborn placed in formalin stimulates a collective reflection around the 0 to 9-month durational cycle of natural childbirth.

The *UNBORN_{oX}9* residency for the 2021 ART4MED program was focused on developing an artistic fetal phantom, in two phases:

Phase 1 consisted of material research and was conducted at thr34d5's collective biolab and echOpen living lab in April 2021 by artist and designer Vivien Roussel (thr34d5) in collaboration with electroacoustician engineer Jérôme Dubois (echOpen). They investigated

the echogenic responses of various bioplastic mixtures (based on agar agar, cellulose and other materials) as well as a silicone/cellulose mix using the echOpen echo-stethoscope prototype.

Phase 2 consisted of research into moulding and casting the form of a 26-week human embryo (baby) using the silicone/cellulose mix and was conducted by artist Svar Simpson at the UrsuLab of Antre-Peaux cultural centre in Bourges in August 2021.

Web Platform

Aiming for border-crossing knowledge-sharing – across nations, races, genders, real, virtual, *UNBORNOX9* launches a multi-interface Web Platform to transmit echodata and conduct online reading group sessions for the years 2022-2023. The Web Platform was designed in 2021 by Shu Lea Cheang in collaboration with Nicolas Derambure and Benjamin Cadon of Labomedia.

The *UNBORNOX9* web platform can be accessed via two different interfaces:

(1) Sonic intervention - forking echodata
Derived from *UNBORNOX9*'s hacking of inaudible ultrasonic waves, this interface makes the echodata scanned by stethoscope available online for downloading. Any interested authors can contribute their own audio interpretation of the echodata and upload it to the collective soundscape. This archive of re-processed ultrasonic data is programmed for random retrieval, prompted by the online audience's interaction through typing on keyboards. This sound intervention accompanied by data glitches launches multi-channel virtual communication with the unborn.

(2) Online reading groups
For the studies of three specific topics – ultrasound, ectogenesis, surrogacy – a leader is invited for each topic to guide a public online reading session. Joined by registered online readers and the general public, the live online event incorporates reading materials, co-writing pads, online chats and audio streaming in its multi-interface entries, in order to engage public debate on these specific subject matters.

Art Installation

As an art installation, *UNBORNOX9* questions the development of fetuses in artificial wombs outside of the body (ectogenesis) and the cyborg future of parenting. It explores the role of obstetric science in the increasingly technological experience of human reproduction, speculating on new types of bonding that may emerge with artificial wombs. Version 0.1 was designed and exhibited at Chroniques Biennale in Marseille in December 2020 - February 2021. This version was awarded an Honorary Mention at Prix Ars Electronica

2021 in the "Life Art and Artificial Intelligence" category. In the last phase of the ART4MED residency (spring 2022), Future Baby Production focused on designing a version 0.2 of the installation for the Open Source Body festival exhibition in September-October 2022.

ARTISTIC TEAM

Shu Lea Cheang

Shu Lea Cheang (U.S.) is an artist and filmmaker whose work aims to re-envision genders, genres and operating structures. Cheang works with various art mediums and film formats, including installation, performance, net art, public art, video installation, feature-length film and mobile web serial. Her artistic pursuits demonstrate an imagination and desire to cross the boundaries of society, geography, politics and economic structure, thus redefining genders, roles, mechanisms, etc. As a net art pioneer, her BRANDON (1998-1999) was the first web art commissioned and collected by the Solomon R. Guggenheim Museum in New York. From homesteading cyberspace in the 90s to her current retreat to post-netcrash BioNet zone, Cheang takes on viral love and bio-hack in her current cycle of works. Her new work 3x3x6, a mixed-media installation representing Taiwan, was exhibited at Venice Biennale 2019. Cheang is currently at work on UKI, a sci-fi viral alt-reality cinema and *UNBORNOX9* with FUTURE BABY PRODUCTION.

Ewen Chardonnet

Ewen Chardonnet (FR) is an artist, author, journalist, project manager and curator. He's editor in chief of the web magazine Makery.info and writes about citizen science, hacker/maker culture and art&science collaborations. He has participated in many artistic endeavours and contributed essays to numerous publications. He has been a guest curator or art director for festivals and art & technology events.

Future Baby Production

Future Baby Production is an initiative by Shu Lea Cheang and Ewen Chardonnet. In 2016 the echOpen fablab of Hôtel-Dieu hospital in Paris, an open and collaborative project and community fablab with the aim of designing a functional low-cost and open source echo-stethoscope (portable ultrasound device), invited the two artists/authors to collaborate and contribute to the community project through artistic practice and skills. This opportunity led to the *UNBORNOX9* project. Soon a large team of interested artists and cultural facilitators joined the initiative and started working on the various dimensions of the hacking performance project. The Future Baby Production collective name represents the common group effort to raise issues such as the possible impact of low cost echo-stethoscopy on Global Health issues, questions of access to healthcare and motherhood, ectogenesis and the technicization of reproduction, and the back-and-forth between science-fiction imaginary and science in the making at large.

RESEARCH PARTNER

echOpen Foundation

echOpen Foundation is an open and collaborative project bringing together an international community of multidisciplinary experts and professionals around a common goal, to make medical imaging accessible everywhere in the world. echOpen was born in late 2014 as an open community project gathering people interested in m-health and e-health devices for the future of medicine around the world. Its common objective is to design an affordable and open source ultrasound probe connected to a smartphone, for the radical transformation of diagnostic orientation in hospitals, general medicine and medically underserved areas.

In 2015 the echOpen community reached 200 members, and in February 2016, working closely with physicians who have pioneered the concept of echo-stethoscopy, we developed our very first prototype. Today we continue our journey working hand-in-hand with technical and medical communities, involving them in our experimentations with new applications of the device. Our goal remains unchanged: to make medical imaging accessible around the world.

PRODUCING PARTNER

ART2M

ART2M is a digital arts & innovation agency based in Paris, France. The SME is a network of artists, designers, journalists and engineers that organises art exhibitions, festivals, symposiums, and produces research residencies, artworks and digital content. Its bilingual (French/English) online media Makery.info aims to reflect these dynamics and provide information on creative communities and lively reports on science labs, fablabs (fabrication laboratories), makerspaces (for community tinkering), hackerspaces (spaces self-managed by people wanting to divert technologies), medialabs (dedicated to new media experimentation), living labs (also known as third spaces, encompassing user-industry co-designs in processes of innovation and experimentation), biohacklabs (the scientific, DIYbio and bioinformatics version of hacklabs), artlabs (dedicated to artistic production), ecolabs (dedicated to ecology & resilience), air & space labs (community labs in the field of aeronautics & aerospace). Makery.info provides media coverage on creative communities in art, design, science and technology, on the social impacts of technological innovation, on artists and designers developing works on sustainability, access to healthcare, ecology, inclusiveness. Its medialab (medialab.makery.info) maps out grassroots "lab" initiatives in art, design, citizen science, and supports artistic research, production and events in art and biomedical research, art and marine biology, art and space, productive resilience.

5/ m/other: arts of repair

Looking at the potential of artistic approaches to reproductive justice and mental health

By **Ida Bencke** with
Edna Bonhomme, Artist, **Nazila Ghavami Kivi**, Artist,
Luiza Prado de O. Martins, Artist and Researcher
Producing partner: **labae** in collaboration with
Center for Arts and Mental Health,
ARIEL - Feminisms in the Aesthetics

A curatorial practice of care: An Activism of Tenderness

For the ART4MED project, the Laboratory for Aesthetics and Ecology undertook a residency journey at the Center for Arts and Mental Health, a hub for trans-disciplinary collaborations across psychiatry and the arts. The residency was orchestrated around an exploration of a curatorial practice as a practice of care, and started from the hypothesis that *carefully curated* art exhibitions are capable of creating holding environments for psychiatry users. The etymological roots of 'curation' and 'curator' stem from latin *curae* – a word that holds the entangled meaning of care and cure in one. The residency started with the question: What would a curatorial practice look like that did not only thematize care, but actively sought to establish and hold a careful environment for artworks, audiences, host institutions and artists alike?

The residency also took as its point of departure the idea of tenderness as a working methodology. Tenderness refers to an affective stance towards something or someone, and something receptive or sensitive to pain: a sore spot, a burgeoning ache, a potential hurt. Tenderness as curatorial methodology requires

an ethos of care that does not shy away from self-critique and a willingness to admit to failure. Tenderness demands an opening towards vulnerability, of allowing oneself to get hurt and at the same time admitting to the ability of hurting someone else. Tenderness is required in the renegotiation of collaborative structures, in the practices of letting go and allowing for the emergence and reformulations of different axes of experiences and knowledge to take shape. In her work around precarity as material (social, economic, political) circumstance, Judith Butler gestures towards a practice of resistance based within the conditions of vulnerability. Instead of eschewing or hiding precarity, Butler argues, there is a need to emphasise and invest in practices of refusal that challenge the muscular, able-bodied model of resistance. As artist and cultural theorist Johanna Hedva asks in her seminal essay *Sick Women Theory*: What are my possible routes of protest, when I cannot even get out of bed? In her essay *Revolt, She Said*, Kristeva reminds us of the etymology between revolt and repair, and points to a particular kind of insurgence that centers and emphasises strategies of recuperation, regeneration and healing.

During the residency, these ideas were discussed and negotiated in deep and sustained conversations

between the psychiatrists and psychiatry service users of the Center for Arts and Mental Health, the curatorial team and the invited artists.

m/other spaces of repair

The residency started with a curated art exhibition exploring questions around motherhood and otherhood in an expanded field. The old, abandoned hospital ward provided a pregnant space for negotiation of the institutional structures around care work and reproductive labour. Quite concretely, in our culture it is in hospitals that mothers are 'born', as standard birthing practices are located here. In a wider sense, medical institutions both mother and other (some of) us in ways that call for critical reflections upon the histories, practices and biases within these systems of both care and control. The m/other exhibition explored these themes through artworks, immersive installations, performances, workshops and talks aiming to renegotiate the hospital as a space of care via artistic and collaborative methodologies. An artist collective of local psychiatry users, for example, re-designed a hospital room, and invited the public to take rest within it. 'Tenderness Activist Resting Space' was a soft(ened) and quiet space that challenged the hospital architecture and called for appropriating and reinhabiting institutional healing spaces in radically different ways. The experience of opening the hospital as a curatorial space of reimagining and reinventing spaces of care proved to be generative and difficult at the same time.

The idea of the hospital as a host (also intricate to the etymology of the hospital), and ethical and practical questions around how to be a good host (and in turn, how to be a good guest) became pressing during the m/other exhibition experience.

Questions of structural violences and biases within the medical system, of trauma and deep vulnerability came to the surface, as the exhibition triggered strong emotional reactions among audiences and participants. The question of how to prepare audiences properly for such an intense, curated space came to the surface. At the same time, questions of how to prepare the curatorial team (with little to no previous experiences within the psychiatry) to properly respond to such reactions also became evident. Our experience was that working in and with vulnerability demands tools and skills that we (and the art world in general) were in utter lack of.

What also became very clear from this initial curatorial project was the need to renegotiate the temporal structures of art exhibitions, outreach and audiences. A slow, more careful and collaborative curatorial strategy, with the possibility of putting things on pause or hold for collaborators to rest or recover, became crucial. Furthermore, discussing the outreach strategy and success criteria of audience numbers and engagements took center stage, as the standard idea of 'the more

the merrier' became problematic. Exhibitions (and productions) are sometimes noisy and messy, which poses a problem within a context of mental illness and sensitivity. In addition, inhabiting a hospital space with a large number of able-bodied art audiences is neither an innocent, nor an unproblematic activity. The m/other exhibition opened these conflicts to the curatorial team, and generated important – and still ongoing – conversation about how to adjust a curatorial practice to the needs of a vulnerable host and context, and not the other way around.

Writing with and through traumas of racial bias and reproductive injustice

From the beginning, the residency had a special focus on reproductive justice within the standardised health system. Artists Edna Bonhomme and Luiza Prado were invited to engage with questions around racialisation and health, and non-western birthing technologies. During the residency, they developed sound- and installation works that spoke to the experience of inhabiting othered and marginalised bodies, and the health consequences thereof. The sound works were presented during a public session held in collaboration with the feminist collective ARIEL, who also facilitated conversations between Bonhomme, Prado and the Intercultural Women's council around racialised patient experiences within the Danish health system. From this conversation sprung a project around writing with and through the birthing traumas of racialised women. Artist, scholar and writer Nazila Kivi opened this space of reparative memory work, by conducting a series of workshops in which minoritised women could meet and write through experiences of being othered by the health system in birthing experiences. The resulting texts are being translated into a number of languages, and will be published along with texts around reproductive justice and guides to consent-based birthing practices. To conclude the residency, these texts will be presented and discussed via public events, workshops and a symposium hosted by the Center for Arts and Mental Health, and also disseminated within medical settings as a leaflet.

ARTISTIC TEAM

Edna Bonhomme

Edna Bonhomme is a writer, historian of science, and interdisciplinary artist. Her work interrogates contagion, epidemics, and toxicity through decolonial practices and African diaspora worldmaking, asking: What makes people sick? Her practice answers this by exploring the spaces and modalities of care and toxicity that shape the possibility for repair. Edna holds a Ph.D. in the History of Science from Princeton University and a Master's in Public Health from Columbia University. She has collaborated on and exhibited multimedia projects at Haus der Kulturen der Welt, Galerie im Turm, Display Gallery, HAU Berlin, Savvy Contemporary, and other interdisciplinary spaces.

Luiza Prado de O. Martins

Luiza Prado de O. Martins is an artist and researcher born in Rio de Janeiro in 1985, four hundred and eighty-five years after the Portuguese first invaded the land currently known as Brazil. She holds an M.A. from the Hochschule für Künste Bremen and a Ph.D. from the Berlin University of the Arts and is a founding member of the Decolonising Design platform. Her work examines themes around fertility, reproduction, coloniality, gender, and race, and looks into encounters between human and plant beings within the context of herbalist reproductive medicine, approaching these practices as expressions of radical care.

Nazila Ghavami Kivi

Nazila Ghavami Kivi holds an M.A. in Cultural Encounters and Communication from Roskilde University and a B.Sc. in Public Health with Gender Certificate from Copenhagen University. She has worked with Sex Education and Diversity for more than 10 years. She had a research year in Social Medicine focusing on reproductive health for minorities in pregnancy and childbirth, and works with the intersections of language, culture and equity. Public speaker on diversity and equity on ethnic minorities and LGBTQA+. She is a Literary critic in Danish daily Politiken and translator of literary fiction from Persian and English to Danish, as well as a frequent essayist on subjects regarding gender, maternity and reproductive justice.

RESEARCH PARTNER

Center for Arts and Mental Health

The Center for Arts and Mental Health, Copenhagen is a community-based multi-arts center aimed at providing opportunities for psychiatric service users to work with professional artists in developing and participating in artistic workshops and curatorial projects as spaces for healing and recovery focusing on meaningfulness, interconnectedness, de-institutionalization and care. In the mental health care system it has become apparent that medicine alone cannot cure mental illness and that treatment should be more person-centered, inclu-

ding a fuller conception that entails social, existential and also aesthetic needs.

The Center for Arts and Mental Health is a result of an identified need in the mental health care system for more holistic approaches to treatment of mental illnesses. For the last 30 years, main-stream psychiatry has been dominated by a reductionist, bio-pharmaceutical approach. Yet, there runs a deep connection between art and mental health with both therapeutic and diagnostic implications. Exploring and consolidating this holds value for both psychiatry and for the arts.

The Center for Arts and Mental Health works in close collaboration with The Mental Health Care Center Amager in Copenhagen, where psychiatry-users are offered participation in art-groups facilitated by professional artists as part of their psychiatric treatment. The center also runs a research-program consisting of an interdisciplinary team of psychiatrists, philosophers, artists and service-users investigating the effects of art on mental health.

PRODUCING PARTNER

Labae

The Laboratory for Aesthetics and Ecology (Labae) is a curatorial platform for planetary becoming that works with the embodied, theoretical and political implications of global, but unequally distributed environmental breakdown. Labae employs collective strategies in (re) working artistic experimentation towards other ways of inhabiting worlds. Guided by questions around reproductive labour of the everyday, colonial violence and collective exhaustion, Labae works towards new institutional, collaborative and pedagogical models founded within an ethos of solidarity and radical care. Labae facilitates a myriad of multidisciplinary events, exhibitions, workshops and symposia across landscapes, disciplines, contexts and histories spanning from rural spaces, festival sites, ocean shores, boats, hospitals, academic and exhibition spaces, and more. The methodologies of Labae are performative, experimental, and flow through and across genres, aiming for long durational, cross-pollinating knowledge productions in conversation with many partners. Labae runs a small press that publishes and translates work that explores intersections and crossings between the poetic and the academic, the affective and the scientific, the personal and the political.

INTERVIEWS / REPORTS,

1/ Dr. Adriana Knouf aims for transgender space travelling

Adriana Knouf interviewed by **Tonya Sudiono**
First published on Makery.info on March 21, 2021

Hey Adriana, welcome to Waag. You're from the U.S. originally, right?

Well, I'm from Boston, where I work as Assistant Professor of Art and Design at Northeastern University (Boston). I mainly worked and studied there and in upstate New York.

What brought you to Europe?

One of the reasons is that in Europe, there's more support for culture and funding for the type of research and art that I want to do. It's a financially safe and stable position to be Assistant Professor in the U.S., but of course you have to do a lot of teaching and do service work at the university. This I enjoyed, but it leaves only the semester-free summers to work on my own research and art. The question arose: Do I continue on this path or jump into the unknown? That's when I decided to go to Europe. I'm now trying to find my community here. Also, in Europe, and in the Netherlands especially, I actually have rights as a trans person at the national level.

We heard that you have plans to settle here for a longer period of time. What makes Amsterdam attractive to you as an artist?

There are more people working on similar research. There's more of a culture to do my kind of research

within an artistic framework. And there are more institutions that support that. Take Waag, for example. There's no equivalent of an institution like Waag in the U.S.

You're going to work on the ART-4MED project at Waag, a European collaboration of five partners where 'art meets open science and technology in health and medical research'. What are the first differences in healthcare that you noticed when coming to Europe?

Let me emphasise that I arrived here as a very privileged transgender woman. In the U.S. most people get access to healthcare through their employer. No job? No healthcare. Or you can get it through government-run exchanges as a result of Obamacare, that don't give you the same benefits for the same amount of money as someone getting healthcare from their job.

As you might know, American public healthcare is extremely expensive. The 'eigen risico' is only around 385 euros in the Netherlands, compared to amounts of \$1500 or \$3000 and more in the U.S. Although I've heard from one of my best friends that the Dutch healthcare system is turning more and more neoliberal and is beginning to look more like in the U.S.

On the other hand, some things are easier in the U.S. once you've found a specialised doctor or clinic. In Boston, I went to a queer and transgender clinic. They

work with an informed consent model. On the first appointment, you have to file an informed consent document, they'll explain the risks of hormones, and a blood test. On the second visit, if the blood test comes back normal, you get your hormones. There's no need for psychological evaluation, no gatekeeping and no long waiting lists. I've heard that there are waiting lists up to years in the Netherlands, if one wants to get transgender healthcare.

I used to be a social constructivist when thinking about gender: that it's mostly performance, and that you just do what feels right. But I discovered that gender also has a biochemical component. Especially when your hormones switch to a body that has more oestrogen than testosterone, rather than the other way around.

When I came to the Netherlands, I had to ration my oestrogen hormones for a month and a half because the paperwork for the residence permit and the health insurance still needed to be completed. This additionally taught me the immense power of the hormones, especially as it pertains to one's emotional state.

Those hormone patches are life-saving things for me. I never want to go back to the way it was before I was on hormones. It's not pleasant for me, it's not what I like. With a smaller amount of oestrogen, I experienced anxiety that comes with low oestrogen levels. My emotions were all over the place. Through all of these experiences I would now say that sex and gender are biochemically intertwined.

In 2020, you were an artist in residence at one of the other five ART4MED partners: Kersnikova Institute in Ljubljana (Slovenia). What did you work on that year?

Ever since I was a child, I've always felt the desire to go somewhere else. It's tied to the experience of feeling alienated from the world and even my own body, as a kid. I used to go out in the backyard and signal with a flashlight up to the sky, for the aliens to take me somewhere else where it would feel hospitable to me.

That's why I have been exploring xenology for the last few years. It's a way of thinking about how we can make ourselves 'other', in order to explore the possibilities of change. Space is one marker of this possibility. How could I as a trans woman be able to go to space? Well, first I would need my hormones. At Kersnikova, I worked on both scientific projects and artworks tied to this topic.

What was the scientific part that you worked on at the time?

This was part of a project called Xenological Entanglements. 001: Eromatase. We started working with mou-

se testicular cells to gain more understanding of how to culture them and to understand how to characterise their hormonal production. The research question was: can one use CRISPRa (a genetic method that allows us to "activate" a gene in a cell) to "turn on" the aromatase gene in these cells, so that the testosterone that is normally produced would be converted into oestrogen?

This is a difficult task. Eventually, we were able to begin with the groundwork: learning how to culture the cells and developing protocols to characterise the produced hormones.

What is the goal of the research?

Eventually we want to work with my own cells that are collected through a biopsy on my own testicles, to see if CRISPRa can make them produce oestrogen instead of testosterone. In part, this is also a way to rethink how we relate to the testicles and their cultural coding, pushing them away from their position as these hyper-masculine elements of the body.

There are many ways of being a trans person. Some people feel just fine with changing their name, appearance, or being on hormones. Others feel a need for surgeries to address dysphoria. I think in general though it would behoove us to remove the coding we have inherited that marks certain genitalia as being essentially masculine or feminine.

A lot of people find genetic engineering scary. How would you reply to that?

Well, I could start off with the blasé answer that we have been genetically modifying plants and animals since the rise of agriculture. I'm less concerned about genetic engineering per se, but rather that it will be purely profit-driven. These tools are currently used primarily by large for-profit pharma companies or within academic research labs. Take the corona vaccines: we could have more of them if they were open sourced. Perhaps we wouldn't be in the state we are now with vaccine distribution if they weren't controlled by patents. Why should we leave it up to the big commercial companies to experiment with genetic engineering?

It's all the more important to make sure that everybody has open access to this technique, within the possibilities of generous legal frameworks. I'm working within the context of trans bodies, where I'm exploring the possibilities that are already within us. We are already transforming our bodies hormonally and surgically, so why not also genetically?

What else did you do at Kersnikova?

I was able to send a very small artwork to the International Space Station: TX-1. I sent fragments of my hormone replacement medications, and one of them was part of a patch that I actually wore.

So pieces of a trans woman actually did travel into space?

Yes! The patch orbited in space for a month on the space station and then came back to earth.

What are you planning to work on during the upcoming year at Waag, as an artist in residence?

I want to continue working on CRISPRa and genetic engineering. I'd need to find some partners to do that here, because of the legal regulations. Hopefully this work could also lead to some public workshops and discussions about the technique and genetic engineering more broadly.

I also want to explore some broader questions about our relationship with other entities on this planet. This is connected with the opportunity to work with Dr. Heather Leslie (microplastics researcher, VU) within ART4MED. How can we move from thinking about other entities on the planet from the position of the commensal?

Can you explain to the lay person what commensal means?

Commensal means that you're living alongside each other, within the same niche. Not symbiotic, not pathogenic: just together and alongside, with occasional benefits. Take your gut or skin bacteria and fungi: we live with trillions of them, and most of the time we're not aware of their presence. But also take the microplastics, for example, that litter our oceans. How do we learn to live with this?

Shouldn't we keep fighting against environmental pollution?

Of course we have to ensure that it doesn't get worse. But we're not going to get rid of all these plastics that already litter the oceans. They're with us – and the organisms in the ocean – now. We need to learn how to live with this, while also working to reduce the amounts that we add to the environment in the future.

In a sense it's also connected to my extraterrestrial research. How do we live with the cosmos? How do we learn how to "be with" other entities, whether they're on this planet or out there in the universe? I'd like to have the abilities to experience the cosmos in as many ways as possible. I want to know what it is to be

a different kind of physical phenomenon, like light. I just want to know what it means to experience these things. And to experience a communion through this.

That's some deep shit. How do all these things come together?

In the end, it's all about living alongside each other and interconnection. The relation between the two projects is to deliver hormones with the commensal body! I don't know yet where it's going to go as an artwork, but first I'm going to do a lot of research in ecofeminism, ecology, and other relevant scientific domains.

We're also going to host a public programme and workshops with you at Waag. What kind of groups would you like to reach out to during your stay?

I want to reach out to trans and queer groups. I'm also planning to talk with the Trans United Europe health clinic in the Red Light District. Also, I'd like to do a workshop with other queer and xeno people about xenology. But I also want to invite a broader audience and scientists for the workshops with CRISPRa. What's the imaginary around these technologies, and how can we learn to work with them differently?

2/ Emilia Tikka: Transformation with the 'more than human' in the Arctic

Emilia Tikka, Erich Berger from Bioart Society and Leena Valkeapää interviewed by **Rob La Frenais**
First published on Makery.info on November 24, 2021

The conversation documents the early stages of the project. Some key elements of the concept discussed here have since taken a different direction.

Erich Berger, can you give an introductory description of the complex collaboration between Emilia Tikka and Leena and Oula A Valkeapää?

In its essence the project is about the question of human adaptation to a changing environment – now in the face of a planet in transformation because of human impact – but also in the long run because we know from the past that planetary conditions do change on their own. Currently predominant considerations are to counteract those changes and to preserve the environment to support human life as we know it. But what if we were to go the opposite route (without of course throwing environmentalism overboard) – think about deep human futures and speculate about directed human evolution xeno-optimizations – to adapt to an ever changing world? With Emilia Tikka, these speculative scenarios are drawn from existing realities and stories of the past, and are situated in the geographic area of the Finnish Sub-Arctic and Sápmi reindeer herding tradition. That's why she is collaborating with the Valkeapääs. In the context of ART4MED, the project aims to underline how issues of human biomedical health are increasingly connected to issues of the environmental crisis. The work also wants to imagine biomedical applications of genome-editing beyond genetic determinism and human exceptionalism

indicating the human condition as deeply entangled with more-than-human worlds.

Emilia, how were things going in the sound-recording stage of the project in Lapland, from which you had recently returned?

The recordings went really well, we were recording sound and music for Oula's film, which is in production at the moment. Oula uses his own voice for the voiceover and music for his film, which makes it very personal. The home sound studio in the northernmost fell region in western Finland gave a depth to the voice that could not have been reached in a classic studio setting elsewhere.

Your project involves deep human futures. How, speculatively, do you see the transformation of humans to more closely relate to the ecologies of the 'more than human' such as reindeer?

Our common starting point was to discuss the current state of human presence in nature in the area where Oula lives, and how that shows in contemporary reindeer herding culture. For this, Oula's personal

experience and perspective as a reindeer herder has been central. We decided to focus on the nomadic aspect of reindeer herding, and the human relation to nature within the culture now and in the past. For example, nomadic herding used to be an ecological way-of-life. Because of the migratory movement, the soil was able to rest. Since the nomadic ethics of the past are still present in Oula's herding practice, he is able to discuss the ongoing changes that he witnesses including technologization and diminishing space for herding.

Further on, the project turns to imagine a different kind of future, led by the ethics of the past. The idea behind the speculation of change through a biomedical transformation is connected to a wish to remember something that has been lost. The transformation is a starting point to remember, but also to see things differently, a starting point to a different kind of (human) future. The idea is not to become similar/same as animal/reindeer but to shift the perspective so that it includes more than just human-centered visions of a future. As the human-reindeer relation is shifting now through modernised herding practice, the future-part of the work will speculate on a different turn, where humans need to re-establish the connection to reindeer (more-than-human) to survive themselves. This indicates an idea that humans can only survive if they acknowledge other living things and the shared histories with them.

How do you connect your experiments with CRISPR gene editing in the lab with your storytelling narratives such as *Aeon*? Is it just a matter of informing yourself of the technological procedures to inform the narrative or is there a more direct connection between the science and the art?

As I have a background in design and my practice is based on speculative and critical design approaches, the core of these approaches is to speculate (through design and storytelling) on societal implications of yet non-existent technologies, however informed by the science of today. The goal is to create narratives that engage people to imagine the present day differently, look at things through a critical lens, and perhaps see that different kinds of present(s) could be possible. The unreal/speculative is used as a space to explore ideas and sometimes to challenge hegemony/state-of-art today. My works are not necessarily limited to the scientific facts of today, and often propose an element we don't yet know, as a speculation. However, these speculations are deeply informed by science, and it is important to me to have an understanding of the science also at the hands-on level.

I started my journey of learning about synthetic biology and later genetic engineering by being part

of a citizen-science group. Later I also did laboratory residencies where I used the technology myself in an institutionalised laboratory setting. My work is therefore not solely about creating speculative stories informed by science, my work also functions the other way around. I have brought an aspect of speculation into scientific protocols, like with *Aeon*, for example. Together with the scientists, we speculated how a particular protocol usually used for understanding cellular programming of human cells could be used for other purposes – in our case, a “clock” to turn back time at the cellular level. The protocol usually used to ‘understand how something works’ was now used to create a poetic element through speculative mindset. This also allows scientists to see their everyday lab work differently. I was interested in what could be discovered if the scientists were looking for something that they are not usually looking for, seeing their work through different lenses. Speculating together in the lab was possible, because I understood the basics of the science they do, and they understood what I was trying to do. In this project my main collaboration partner is of course Oula, and therefore the perspective through which I look at science also comes from our conversations. There might be a scientist involved later, but more in an advisory role. In order to look at science imaginaries from different perspectives, through a more-than-human perspective, this time the speculation does not start from science.

Do you agree with, or just want to explore, issues around transhumanism and the post-human?

As my previous works critically engaged with human ‘optimization’ around ageing and psychology, the aim from my side was to connect these issues to urgent environmental questions. The working title “Xeno-optimizations” referred to another kind of optimization, one that would step out of the human centered-ness. The ‘optimization’ would be driven by different ethics, seeking a connection to nature and other living things. The title of the work will probably change, but this perspective was interesting to start with. We explore this question further together in a more situated manner, as we focus on nomadic reindeer herding, where traditionally the reindeer – not the human – is central. Therefore the nomadic herding practice is not human-centered. Oula's perspective and his personal relation to his herd has been crucial to establish this way of looking at the human-nature relation. Our perspective leans more towards the post-human approach, however without forgetting the human.

Our notion of planetary survival is very human-centered. What can we draw from the knowledge we gather from other species, and do we humans have a responsibility toward those species?

In the process, Oula shared his ancestral knowledge on herding and his personal perspectives about many things that a herder learns from his herd and how the ‘reindeer perspective to nature’ comes from the time spent with animals, observing them, following them in their migration. In this sense the herder's perspective is more-than-human, because a good herder has to see the environment as the reindeer would see it in order to live with them. But also thinking about all (migrating) animals, which are kind of automatically ecological, the human seems to be the only species that is not aware of the traces he/she leaves behind. I think all of us agree that we as humans definitely have that responsibility.

On the science and technology level, how would the ‘xeno-optimization’ actually take place? Is the science already developed enough?

The project is not about proposing that biotechnologies would be the solution, even if it were possible. Rather, the work aims to ask what ethics are driving techno-science? Whose visions of the future? As the kind of modernist idea of technological progress has driven the planet to the situation we are in, it is time to widen the spectrum of techno-scientific imaginaries, to start thinking differently: what is ‘progress’ and to whom?

What do you think the outcome of this project would be, or is it too early to say?

The final work will be an installation including two films. Oula's autobiographical film is a non-linear story, describing the events of one summer as he experienced it. The film is a poetic story about a life as a contemporary semi-nomadic reindeer herder, whose life is deeply connected to the past. It is about the connection between herder, his reindeer and the environment, however including the struggles of being human, the power of it. It talks about the nomadic way of life in which nature, more particularly the migration route of the reindeer, is the home of the herder. The film discusses what it means to be human in this setting, and how being human is deeply connected to living with reindeer. On the other hand, it is also a melancholy story about the inevitable: the vanishing of nomadic herding and the culture around it, and about the sadness of witnessing it.

The other film will be a fiction about a different kind of future, where nomadic herding returns in a different form. The aim is to speculate: what if the ethics of nomadic reindeer herding drove the development of the area? The unreal and the speculative are taken as a space to discuss the problematics of the present day. In the story, an ecological collapse will be a turning point to start thinking differently. It is a story where the

lost human-reindeer connection is ‘restored’ through biotechnologies. In the story a bygone herd of reindeer carries memories of the shared past of the humans and animals in their epigenetics. Valuing and restoring these memories will be a key to human survival.

Leena Valkeapää, let's come to specific questions about reindeer herding and the environment. How is climate change reflected in your living environment right now?

Changes in the weather may have a fatal effect on the reindeers' food intake during the winter, as the reindeer dig up lichen under the snow to feed. Changes in rainfall and temperature variations bring out problems. When it rains a lot in the fall and the ground is still wet when the rain turns to snow, the ground will grow mouldy. The mould spoils the pasture, so the reindeer won't get food from the wild. Another problem is in times of snow cover, strong temperature alterations cause the snow to freeze. In this case, the reindeer cannot get food through the ice. These types of challenging weather conditions in the winter mean that reindeer have to be fed by the herder. Feeding reindeer is expensive and challenging. Feeding also eutrophicates the soil (causing excessive richness of nutrients), which is bad for lichen growth. Thus, feeding weakens the condition of the pastures.

How is the nomadic lifestyle of the past reflected in Oula's own current shepherd life? Did he already see this reindeer-herding as art when you were working outside the artistic context 20 years ago? (as Joseph Beuys implied when he said that every human activity can be seen as art)

In Sámi art history, the relationship between art and reindeer herding life is inseparable. The Sámi artists Johan Turi, Paulus Utsi and Nils-Aslak Valkeapää, who are close to Oula, have not distinguished between art and reindeer life. For Oula, an understanding of contemporary art and reindeer herding means a process that does not have locked-in categories of art or everyday life. Reindeer life inspires and gives content to art. Art, on the other hand, brings depth and significance to reindeer life. This dialogue is a central part of Oula's life.

What are the main elements leading to a reduction in movement in reindeer life?

The national borders between Finland, Norway and Sweden fragmented the nomadic herding culture. In Finland, the state has organised reindeer husbandry as part of agriculture. The mainstream culture based on

a sedentary way of life has stopped the nomadic movement. The nomadic way of life seems to be cramped all over the world, as so many livelihoods compete for space.

Would you also like to tell us how you have worked together in the past?

I've been working with Oula since we met each other, and I started asking him fundamental questions. The first joint project was my dissertation (2011). Oula's text messages play a key role in my dissertation. With his messages, he answers my questions directly in the situation where the answer was completed in his mind. For example, when the wind reverses the direction of the reindeer and Oula's plans change, the message written by Oula summarises the situation, from which I understand that the mood plays a key role in Oula's life. The messages are also independent works that we have used in the multimedia works *Manifestations* (2017) and *In the Wind* (2019). Asking questions and preparing and receiving an answer is our way of sharing experiences with each other and the audience. Dialogue provides us with a space of thought and content that transcends everyday life.

We started cooperating with Emilia, as our mutual dialogue has already become commonplace from time to time. Emilia's involvement brought us back to the beginning of our thinking, as we had to explain the basics of reindeer life to her. The process of explaining is awakening, as the understanding of one's own everyday life becomes clearer. Emilia also gave us a reason to work and try out the possibilities of our sound studio. We got production support, and it helped us to use the new technology. With this collaboration we also hope to have new audiences. The hopeful attitude towards the future in Emilia's work is an important aspect for us, as the everyday reality of reindeer herding feels a little bit desperate at the moment.

3/ The Smell of the Human: Bio-reactors for the skin

Helena Nikonole & Lucy Ojomoko

interviewed by **Rob La Frenais**

First published on Makery.info on May 18, 2021

Helena Nikonole, in your artist's statement of *Quorum Sensing: Skin Flora Signal System* you talk about potential risks and dangers that techno-evangelists and scientists are not able to realise. Can you give us some examples?

By mentioning "risks and dangers" I mean the opposition to a positivist approach to technology and "solutionism" in Evgeny Morozov's terms - the proposition that we can solve all mankind's problems with the help of technologies. This approach leads to reductionism in a social context and in many cases can finally cause more issues than it tries to address. There are these contrary viewpoints: we can perceive technology as an opportunity or see it in a more critical way, or even as a potential threat. Most scientists and of course all techno-evangelists tend to the first perspective, while a privilege of being an artist is to see things from different perspectives - from utopian to dystopian and also from many points of view in between these opposing mindsets.

So besides the critical approach to technology, if we talk about potential opportunities, I like this ability of great artists to be a medium to uncover hidden capacities of technology through disruptive experiments and abnormal use of it. One of my favourite examples is *The World's First Collaborative Sentence* by Douglas Davis who presented this specific quality of the Internet to create many-to-many (means of) communication.

Another example is one of the first DDoS attacks, which was made by Electronic Disturbance Theater to attack a website of the Mexican president. These are some of my reference points.

Can you talk a little about your curatorial collaborations with Alexei Shulgin in *Learning Machines*?

Thanks for asking! Alexei was my professor at Rodchenko Art School and my graduation project supervisor, and I'm so grateful to have had a chance to learn from him in many cases, just observing the way he looks at things. He just suggested to do a show about neural networks in an artistic context, and this became my first curatorial experience. I remember we joked that we were not "real curators", because we were artist-curators and it's different. The significant feature of the show was to not only present projects from actors socially established as "artists", but also bring scientific research into artistic context, as well as exhibit projects by machine-learning enthusiasts and developers who experiment with neural networks. Another important point was to show different aspects of projects related to AI: from works exploring the aesthetics to projects approaching AI from a critical perspective.

We exhibited some of my favourite projects, like *VFRAME* by Adam Harvey, *Anatomy of an AI system* by Vladan Joler and Kate Crawford, as well as some

projects by great young artists like Medina Bazargali or Gray Cake art group. Also it's important to note that we worked on the exhibition at Electromuseum – which was the only institution in Moscow focused on technological arts at the time. It became a core institution for the community of young new media and sound artists in Russia. The gallery was founded by Alexei and artist and curator Aristarkh Chernyshev. It is a super-low budget and DIY institution, so we made many things, like designing posters and setting up interactive projects by ourselves, but it was fun.

In *Quorum Sensing: Skin Flora Signal System* you propose that people would be able to smell if people were ill, even if they had a hidden, serious disease like cancer. How ethical would this be? I'm thinking about the human rights aspects of things like COVID vaccination passports to cross borders, etc.?

Yes, we thought about this, if we imagine our project growing into a real self-diagnostic tool. We see it as a DIY kit to work with bacteria, so it's the person who decides if they want to use it or not. When it's a free choice it's more ethical. We also thought about pre-defining a way to switch off this smell gene again. If we implemented the project in real life, that would be useful.

You say you can also change a skin microbiome odour to make it unrecognisable or repellent to mosquitoes, in order to protect people living in areas where yellow fever, dengue or malaria are endemic. Is this really possible? If so, it would be revolutionary.

Yes, I think it's possible, and it inspires me a lot that potentially we could help so many people by bringing our DIY kits into real-life. Although before this implementation, we need to conduct a big research to make sure that putting gene-modified bacteria back into skin flora is safe, and to prevent all uncontrolled and unpredictable effects.

Lucy Ojomoko, regarding the potential applications of your project's olfactory nature, you say "For humans, olfaction has significantly lost its bio-semiotic role". This makes me think of the limited world we now live in with the pandemic – i.e. most of our human contact is through rectangular video images online. Do you think we could enhance our everyday

online communication with some kind of "smell-o-vision"?

History knows several attempts to create digital smells to improve audience involvement in what is happening on the screen, which is not surprising because smells are an essential element of social relations. Despite the perfume industry trying to create odour "Esperanto", smells also have their own individual "dialects and intonations" based on the perception of a certain individual. That's why it should be remembered that odour "vocabulary" is less generalised than the visual language, and this kind of communication needs to be applied using more subtle approaches. At the same time, previous experience with digital odours was based on the reproduction of common odours. I suppose that such projects will be successful in the future if they focus especially on personal interaction (e.g. personal messaging, not a group chat or cinema), by reproducing more intimate and individualised smells in the process of internet communication, giving a sense of presence and increasing the level of empathy during the interaction.

You say that as a neurobiologist you are exploring the problem of trans-species and intraspecific communication? Could you give us some examples?

The art experience I was engaged in focused on studying the latest scientific discoveries in terms of contemporary art. With my colleagues I was exploring the problem of trans-species and intraspecific communication. Through these researches, we create and study new ways of neurobiological communication by applying neural interfaces, micro-electronics, and artificial intelligence, connecting with living organisms, and presenting hybrid living systems. By recording the specific parameters of its electrical activity, we processed this data and transmitted it to other biological objects, for example, directly to the insect nervous system or to other humans.

These projects are connected by the idea of transferring human "consciousness" to other biological objects. As a molecular biologist, I consider the possibility of constructing such structures, not only with the help of electronic devices that can work as amplifiers and translators, but also using 'wet electronics' for "molecular programming and reprogramming", which arose evolutionarily, and allowed the creation of unprecedented complex systems such as living organisms. The plasticity of living matter inherent in nature makes it possible to rethink and redirect biological processes into new directions.

So as a scientist working in an artistic context, you are using synthetic biology techniques?

Synthetic biology, which I consider a new stage in the development of molecular biology, has especially succeeded in this. I was engaged in the creation of chimeric receptor structures with new properties that could be used for subsequent introduction into living organisms to expand their palette of cognitive functions. The receptor as a unit of perception and our way of communicating with the outside world is a convenient model for modification experiments that allow us to radically change and expand our experience of interacting with the outside world. Of course, such studies are carried out in accordance with bioethics regulations. All these projects raise questions of cultural understanding and boundaries in implementing neurobiological manipulative technology, in addition to human existence in a new communication paradigm with the transmission of neurobiological information, which is the first stage in the emergence of a "NeuroNet".

Helena Nikonole, your earlier work is focused on a concept of Artificial Intelligence. Does this exist, and is there such a thing as "ethics of AI"?

There is no such thing as Artificial Intelligence at the moment. When we say AI, we mostly imply artificial neural networks that can compete with humans in solving some tasks, but firstly they are too far from being intelligent, and secondly, they perform specific un-human qualities, such as processing vast amounts of data and finding patterns that are incomprehensible to human perception. Calling them "intelligent" and anthropomorphising them is a discourse appropriated by states and corporations in order to make people perceive neural networks as something familiar and friendly, and to justify mass implementation of such kinds of algorithms, which are sometimes problematic in terms of ethics.

Machine Learning is a general purpose technology, which means that it can be implemented in rather diverse fields, and it transforms society on different levels. Of course, this mass implementation of a novel technology leads to new ethical issues and questions, so it makes sense that "Ethics of AI" has to be developed. As for me as an artist, I actually took part in preparing the *Critical AI Practice Manifesto*, together with artists Wesley Goatley and Marco Donnarumma. In short, we tried to point out questions that are important to us and to sketch some approaches to critical and ethical artistic AI practices. Actually we wanted to provoke a discussion: the Manifesto is open, and any artist or researcher can contribute to it.

4/ UNBORNOX9 FUTURE BABY PRODUCTION

Shu Lea Cheang interviewed by Ewen Chardronnet

Can you describe how the project UNBORNOX9 was... born?

In 2016, the echOpen fablab at Hôtel-Dieu hospital in Paris – an open and collaborative project and community fablab with the aim of designing a functional low-cost and open source echo-stethoscope (portable ultrasound device) – invited us (artist/author Shu Lea Cheang and Ewen Chardronnet) to collaborate and contribute to their community project through artistic practice and skills. This opportunity led to the UNBORNOX9 project and the Future Baby Production collective composed of artists, scientists, programmers, engineers and cultural facilitators who expanded on the various dimensions of the project. The Future Baby Production collective represents our common group effort to raise issues such as the possible impact of a low-cost echo-stethoscope on global health, access to healthcare and motherhood, ectogenesis and the technicisation of reproduction, the discourse between science-fiction imaginaries and science-in-the-making at large.

What artistic forms does the project take?

As an art installation, UNBORNOX9 questions the development of fetuses in artificial wombs outside of the body (ectogenesis) and the cyborg future of parenting. It explores the role of obstetric science in the increasingly technological experience of human reproduction, speculating on new types of bonding that may emerge with artificial wombs. Here, pregnancy is “integrated into a high-tech vision of the body as a biological component of a cybernetic communi-

cation system”¹. Treating a fetus as if it were outside a woman’s body, making it visible, is a political act.

As a performance, UNBORNOX9 forks the echOpen prototype with network protocols and hacks inaudible ultrasonic waves in a sonic conversion that is further interpreted in collective audio-visual manifestation. Making the ultrasound frequencies audible and visible prompts an augmented interaction with the unborn. By reverse-engineering the ultrasonic device, we reclaim the act of intervention as we jointly compose asynchronous ultra-infused love songs for the unborn.

How did you approach the “cyborg future of parenting” that led you to the actual ART4MED residency?

Considering the cyborg future of parenting, we made up these 12 pregnancy typologies:

1. Pro-life motherhood (religious, anti-abortion, anti-contraception, etc.)
2. Pro-choice motherhood (abortion, pill, artificial insemination...)
3. Law-enforced motherhood (when abortion is made illegal)
4. Subversive motherhood (pro-sex feminism, gestational communes and gender queer parenting)
5. Transsex parenthood (trans men, women and non-binary individuals, with or without technological intervention)
6. Denied pregnancy (refuse to believe)
7. Reject pregnancy (political reasoning not to increase population)
8. Unaware pregnancy (imposed by social conditions – sex workers, drug users)

9. False pregnancy, pseudocyesis (phantom pregnancy)
10. Surrogate motherhood (hired motherhood, social work force)
11. Pregnancy after uterine transplantation (cis/trans)
12. Ectogenesis, the artificial wombs (complete or partial).

What drove you to focus increasingly on Ectogenesis, the gestation of fetuses in artificial wombs?

During its development over the last six years, the Future Baby Production united around *Unborn0x9* wanted to reflect on the techno-scientific developments of obstetrical medicine – its social, cultural, philosophical and prospective implications, proposing an artistic look at the science in the making. As we progressed in conceptualising the project, various scientific announcements concerning the development of fetuses outside the body appeared in the scientific press and in mainstream media, raising questions.

In April 2017, at the Children’s Hospital of Philadelphia, an extremely premature lamb was kept alive for four weeks in a “biobag” that incorporated artificial amniotic fluid and acted as an artificial womb². In 2018, Eindhoven University of Technology in the Netherlands also began developing artificial womb “biobags” for human premature babies with support from the European Union’s Horizon 2020 program. Researchers in the program, now called Perinatal Life Support (PLS), are working to design a new environment for premature babies, similar to that of the womb. “In the PLS solution, a baby is transferred to a new environment, called a perinatal life support system, to ease the transition to newborn life. In this ‘artificial womb’, the infant would be provided with a supply of oxygen and nutrients through the umbilical cord and an artificial placenta. This environment allows organs to mature and develop more naturally.”³

Even more recently, in January 2022, the *South China Morning Post* reported⁴ that Chinese researchers at the Suzhou Institute of Biomedical Engineering and Technology have been working on growing embryos in full ectogenesis artificial wombs. In order to optimise the system and make it autonomous, they have developed a system based on artificial intelligence that monitors their development, saying they have tested it on mouse fetuses. “The online monitoring system of in-vitro embryo culture can track and record the morphological features of embryos without affecting the embryo development, providing a basis for the assessment of embryo development and the optimisation of in-vitro culture system.”⁵

These developments raise numerous questions.

Would you see these developments redefining the status of the “un-

born” baby?

As pointed out by Elizabeth Chloe Romanis in 2020⁶, a distinction must be made today between complete and partial ectogenesis. Full ectogenesis can be defined as the creation of an embryo using *in vitro* fertilisation techniques, which is then gestated entirely artificially in an artificial uterus. There is no “pregnancy” carried by a “pregnant person”. Partial ectogenesis for very premature infants, on the other hand, is the development of a fetus in an artificial uterus for part of the gestation period after it has been transferred from the uterus in which it was originally conceived or implanted.

These profound changes implied by the possibility of partial ectogenesis imposed by medical urgency, risk reduction, or guided by a choice of comfort, also lead to the definition of the particular status of the unborn child going through these gestational situations. As Romanis writes, “The ‘human being in an Artificial Womb’ is neither a fetus nor a baby, and the ethical tethers associated with these terms could perpetuate misunderstanding and confusion”⁷. She therefore suggests adopting the term “gestateling” to refer to this developing human entity in *ex utero* gestation. For our part, we chose in 2016 to use the term “Unborn0x9”.

Can you elaborate on the Online reading groups of the UNBORNOX9 Web Platform?

The online reading groups focused on three research topics:

(a) ULTRASOUND

Ultrasound, a technology that originated in sonar detectors for submarine warfare, was introduced in obstetric practice in the early 1960s. It shows the outside world something that previously was confined to the intimate realm of a woman’s body. Nevertheless, ultrasound has an embedded biopolitical aspect, densely connected with intricate social conditions and bioethical issues. Feminist philosopher Rosalind Petchesky writes that ultra-sound imagery “bridges two arenas of cultural construction, video fantasyland and clinical biotechnics, enlisting medical imagery in the service of mythic-patriarchal messages”⁸. Low-cost, open source echo-stethoscopy considered as technological breakthrough has brought ultrasound imaging to smartphones. While the new medical visualisation tools are intended to accompany health professionals in clinical diagnostic practices that favour more equity in access to healthcare, what does it really mean from a feminist perspective today? And more generally, what does the increasing technologisation of pregnancy mean for current developments in the field of artificial or transplanted pregnancies?

(b) ECTOGENESIS

In *Brave New World* published in 1932, Aldous Huxley announces a world where babies are made in test tubes, where the word “parent” has become obscene and banned, as the appearance of ectogenesis has put an end to “viviparous reproduction”. For a century, Ectogenesis, the gestation of a test tube baby outside the body in an artificial womb, has posed various ethical challenges: the end of pregnancy but also the possible end of the privileged relationship between mother and child; complete equality of life between women and men; nature of emotional bonds changed by the process of gestation in a mechanical device; evolved social roles in a society where sexuality and reproduction are separated; transformed notions of maternity and paternity, of the couple and the family; development of same-sex parenting and risking new forms of commodification of the human body. Today, with the current developments, there is a need to identify the fundamental changes in our views of pregnancy that would result from partial ectogenesis or AI-based complete ectogenesis.

(c) SURROGACY

The current highly controversial debates on surrogacy focus on commercial surrogacy, an industry that generates an estimated two billion dollars a year and is connected to the larger world of fertility tourism. Concerns over social justice, women's rights, child welfare, and bioethics call attention to the roles that race/class/gender, religion, legal regimes, biopolitics and global capitalism play in the gestational surrogacy market. Departing from the commodification debate, can we consider surrogacy as a “dyadic body project” that can be “collaborative, dual forms of identity-work”? And further “bring about the conditions of possibility for open-source, fully collaborative gestation”, affirming surrogacy as “the political struggle for access and control – the commoning or communisation of reprotech – that matters most.”¹⁰

With *UNBORNOX9*'s web platform, we intend to explore these issues through deep readings and to engage the public in cross-referencing debates online and through public performance and presentation. Selected topics, ranging from intervention to commodifying women's bodies, from motherhood to un-motherhood, lead us to envision the arrival of ultra-queer polymaternalism worlds.

Notes

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3. See <https://perinatallifepupport.eu/project/background/>
4. Stephen Chen, “Chinese scientists create AI nanny to look after embryos in artificial womb”, *South China Morning Post*, 31 January 2022. Online at: <https://www.scmp.com/news/china/science/article/3165325/chinese-scientists-create-ai-nanny-look-after-babies-artificial>
5. Zeng Weijun, Zhao Zhenying, Yang Yuchen, Zhou Minchao, Wang

Bidou, Sun Haixuan. “Design and experiment of online monitoring system for long-term culture of embryo. *Journal of Biomedical Engineering*”, 2021, 38(6): 1134-1143.

6. Elizabeth Chloe Romanis, “Regulating the ‘Brave New World’: Ethico-Legal Implications of the Quest for Partial Ectogenesis”, PhD in Bioethics/Medical Jurisprudence, the University of Manchester, 2020. Online at: <https://www.escholar.manchester.ac.uk/uk-ac-man-scw:326419>

7. Romanis, Elizabeth Chloe. “Artificial womb technology and the frontiers of human reproduction: conceptual differences and potential implications.” *Journal of medical ethics* vol. 44,11 (2018): 751-755. Online at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6252373/>

8. Rosalind Pollack Petchesky, “Fetal Images: The Power of Visual Culture in the Politics of Reproduction”, *Feminist Studies*, Vol. 13, No. 2 (Summer, 1987), pp. 263-292.

9. Elly Teman, *Birthing a Mother: The Surrogate Body and the Pregnant Self*, University of California Press, 2010.

10. Sophie Lewis, *Full Surrogacy Now: Feminism Against Family*, Verso, 2020.

5/ The Arts of Repair: Re-appropriating personal history through writing

At the Center for Art and Mental Health in Copenhagen, Ida Bencke, Birgit Bundesen and Nazila Kivi organised writing workshops and an exhibition around the theme of maternity. Elsa Ferreira reported on their last session of 2021.

By **Elsa Ferreira**

First published on Makery.info on December 23, 2021

November 19 marked the last of four sessions at Copenhagen University Hospital's Center for Art and Mental Health. For the past two months, Nazila Kivi has been giving workshops around the theme of maternity for marginalised audiences, such as LGBTQ or ethnic minorities. It's all familiar territory for this Danish-Iranian artist, critic and scholar who works on the themes of public health, gender and ethnic heritage, at the intersections of art, activism and academia. “I've worked a lot on bodies, standards, reproduction, racialisation,” she says.

Recognising “ethnic pain”

The workshop was held over four sessions from October 22 to November 19, diligently attended by three women (only one was not able to be present for this last session). All of the participants were young mothers in their thirties and forties, from different backgrounds – one was adopted, another one's parents were immigrants, the third one was born to a mixed-race couple – but they all had one thing in common: a traumatic experience of giving birth.

One of the women, Trine, had to have an emergency caesarean section. She suffered postpartum depres-

sion, she tells us, and is still bitter and angry about the experience. “Telling my story again is part of the healing process,” she says.

Uzma also had an emergency caesarean section. She believes that her hospital stay during the delivery did not go as it should have. “I have a strong feeling of negligence. I have given a lot of thought to what worked and what should have been done differently. We tend to trust the system, but I was not guided, nobody explained to me what was happening.” She also sees writing as a tool to put her emotions in order.

For Nazila Kivi, the experiences of these young mothers are a form of what she calls “ethnic pain”. “It's not an official diagnosis, and the phenomenon is rarely documented – apart from myself, only one doctor was interested,” she says. “It's a term that refers to the presupposition that a pain is not real, that it's dramatised, exaggerated. It's a doubt, a feeling, the sensation that you are treated differently.” This cognitive bias is related to the patient's ethnic origins, and leads health professionals to doubt what the patients are saying, and even deny or postpone treatment.

“In Denmark, we barely talk about these subjects,” says Ida Bencke, co-curator of the ART4MED program and

founder of the Laboratory for Aesthetics and Ecology, an independently curated collective. "We have an immigration policy that puts non-ethnic Danish families under pressure and relies on many stereotypes."

In 2018, the Danish government passed the "ghetto package" law to delineate certain zones according to the percentage of immigrants. "For families that live in the so-called 'ghetto', sending their kids to nurseries and kindergarten to 'learn Danish values and culture' is mandatory," Bencke says. "The free choice of whether and when to institutionalise your children is taken away from you when you inhabit these marginalised zones." In the rest of the country, families are not required to send their kids to kindergarten, nor to school, as homeschooling is permitted in Denmark.

Playfulness as a way to manage crises

Kivi's workshop is a pilot, on a theme that has yet to be explored further at the Center for Art and Mental Health. But within this unit situated in the psychiatric ward of the university hospital, writing is a therapeutic tool to be fully studied in detail.

So the psychiatrists of the Center for Art and Mental Health developed a method deployed over 15 weeks. The objective is to create a safe environment where the patients feel free to explore. The inspiration for this approach was British psychoanalyst Donald Winnicott's concept of the "good enough parent", according to Birgit Bundesen, chief psychiatrist and the Center's director.

"Winnicott observed thousands of children and their interactions with their mothers in order to identify what it takes for a baby to develop a healthy mind," she says. "He found that in order for babies to feel free enough to play on their own, they must have a good enough caretaker in the next room. The primary parent is not the perfect parent, but the one who is good enough to create a safe environment."

In the writing group sessions, it's the same thing: "We want to establish a positive workshop. Art is not not-dangerous, it triggers things in patients. In order to contain this creative process, we need a holding environment."

"This is not therapy through art, it's 'participative art'," Bundesen explains. "Participation and work on aesthetics are techniques used to restructure conceptual, mental and physical faculties. Art is a tool to desynchronise and reorganise the patients' mental material." From this perspective, "playfulness is the active ingredient. If you are able to mobilise a playful mode in the mind, then you are able to handle mental crisis in a different way, because it's a way of keeping your mind fit."

The instructions have been developed to address different mental abilities: take a new perspective on a given situation, address others (for example by writing letters to significant others), have a more positive vision of yourself, write about other memories besides trauma, etc.

Experiencing eye vs. eye of the text

The workshop proceeds in three stages.

– First is the beginning. "It's a stage where there is a lot of anxiety. You don't know each other yet, there is excitement, a lot of fantasies about what is going to happen." The first session consists of establishing this safe environment in which the patients will feel comfortable to play in.

For Nazila, this means "being honest about your own position. The participants know what's at stake, that my interest is personal – some of my work is based on my personal experience – but that there is also a research objective." The artist makes clear the fact that this is not a group therapy, but an artistic workshop.

– Next is the time to be daring. "This is when the group can move on to more daring exercises, such as mentalisation," says Bundesen. "Take for example, the description of a situation involving at least two people. Most people will choose a situation of conflict – fighting at home, being bullied at school – and write about it from an autobiographical perspective. The next stage would be to write the same scene from the point of view of the other person present. The group also works on inner dialogues or transformative processes."

Regardless of the material, the method is the same: "We distinguish between the eye of the experience and the eye of the text. We discuss texts as aesthetic material. It's what we call the aesthetic distance of art: there is a temporal and spatial, but also aesthetic distance."

This same distance allows participants to exchange about heavy and highly personal subjects. "One patient wrote a fable about a woman who was raped by a bear," Bundesen recalls. "When she read her text aloud, it was clear that she had autobiographical material invested in it. We talked about the fable as a genre, how to create horror effects in a text, metaphors... Six months later, during an interview, she told me that she had been raped when she was 15 years old by an older man. She never told anyone, because she feared the mercy of others. Through writing, she was able to share something painful while taking ownership of it – she wasn't the victim, she didn't need to take other people's good advice. It was about the eye of the text."

Meanwhile, Nazila Kivi works using the method of collective memory. "There are a few rules: you must write

in the present tense, according to your own perspective and without rationalising or explaining, only from an emotional point of view." Then the author reads her text slowly, so that the other members of the group can help to analyse it.

– Finally, closure. "This problem is not sufficiently taken into account in art and culture interventions involving people with mental health issues," says Bundesen. Indeed, the group has a tendency to not want the sessions to end, something that the workshop leader must consider from the very beginning by always reminding participants of the finite nature of the sessions and their duration.

In Kivi's workshop, the participants are already searching for a way to continue beyond this last session. In order to conclude this process, the three organisers hope to formalise the workshops in a book that would include all the texts written by the participants during the workshop: poems, fictions, a manifesto on consent... "It's a way for closure, but also a way of opening this conversation to the world," Bundesen hopes.

Restoring "hospitality" in hospitals

If these workshops are held in a reassuring and private environment, Birgit Bundesen and Ida Bencke would also like to open up hospitals to the world. As Bundesen points out, the Latin etymology of the word hospital refers to host or hospice, as a form of hospitality toward outsiders. And the former term for psychiatrist was alienist.

In addition to the workshops, the Center for Art and Mental Health hosted an exhibition open to the public curated by Ida Bencke. The exhibition titled *m/other* was awarded "exhibition of the year" by the Danish newspaper *Information* and explored experiences of maternity, infrastructures and institutions in charge of future parents.

"Most of us have hospital memories from very intense periods of our lives," says Bencke. "It's the emotional baggage that people came to the exhibition with and that we tried to work with."

For the two curators, the exhibition is a non-invasive event that is as meaningful to both people living inside the house as to the general art crowd. "The challenge is to find a way to navigate between preserving safe spaces for residents while opening up to the outside," says Bencke. "For now, I'm not sure that we've succeeded 100%."

Some doctors were not consulted about the exhibition beforehand and were quite annoyed by it, especially one doctor who was upset by a sound installation that was just above the senior consultant office.

"We need more time to build trust within the house," says Bencke. "We also need to jump out of the capitalist agenda to produce nonstop and run very fast all the time, because things get done halfway," adds Budensen.

This ambitious vision seems to be quite within reach of the two women, as Bencke has just been commissioned by the Center for Art and Mental Health to continue working with Bundesen to implement this program initiated in the context of ART4MED. An opportunity to create new relationships... and to rethink old ones.

CONCLUSION,

More-Than-Living

An exhibition to close the ART4MED program and to open up new perspectives

By **Ewen Chardronnet**

In Theodore Sturgeon's science-fiction novel *More Than Human* (1953), a group of humans with strange dis/abilities and powers (hypnosis, telepathy, teleportation) enter into a symbiotic relationship to create a self-sustaining living organism, composed of several individuals, the *homo gestalt*. In this story, Sturgeon is interested in the relationship between dis/ability, power and human evolution, calling for a move beyond *homo sapiens*. For Sturgeon, a living being does not result from the simple addition of the properties of its elements, but from the set of relations between these elements. This concept of "More-Than-Human" was evoked by David Abram (1996) in his environmental philosophy to counter nature-culture dualism and the hegemonic exceptionalism of humans. He opened up the spectrum of interrelations between the worlds of living and non-living beings as well as of human societies.

If the final ART4MED exhibition at the Open Source Body festival in Paris (September 2 - October 22, 2022) marks the need for human societies to feel more alive

than ever after this pandemic that has claimed the lives of many of our loved ones, it also opens up to a renewed, "More-Than-Human" look at our relationship with health and biomedical research.

First, the exhibition underlines the "More-Than-Human" renewal of cultural geography and how artists, drawing on multiple atmospheric, evolutionary, affective and bodily studies, seek to sensitise us to the complex arrangements of co-vulnerability and reciprocity at work between species. Thus, following the sites of reindeer husbandry shows us the need for interspecies care in activities and a consideration for sensory and affective geographies of reciprocity. Considering us humans as holobionts, multi-species consortia, also commits us to rethinking gestures and narratives in our evolutionary becoming.

What Marshall McLuhan calls *sensorium*, or the relationship between sense and environment, phenomenal



Photo:
Adriana Knouf

and psychological perception, cognition and intelligence, varies according to cultural interpretations, and we find these subtle relationships between *sensoria* and *situated knowledges* transversally in the final exhibition. The Anthropocene makes us 'aliens' on our own planet, committing us to multi-species solidarity and a co-evolutionary perspective on the sensory phenomenon of life experience itself.

When René Laennec invented the stethoscope in 1816, he also took the first step toward the technologisation of medicine. Today, from echo-stethoscopy to surgical robotics and telemedicine, from biotechnology to genetics and bioinformatics, we are witnessing accelerated aids to medical practice that are detached from the direct contact between doctor and patient. The field of feminist critique of the cyborg body, as opened up nearly 40 years ago by Donna Haraway, continues to accompany artists when it comes to addressing robotisation and the technologisation of reproduction, prostheses and body augmentation, as well as the

relationship between the science-fictional body and medical science in the making. This cyborg vision, as a figure that challenges assumptions and binaries, remains politically disruptive, progressive and oppositional in its hybridity and liminality.

Finally, the "More-Than-Living" exhibition invites a "crisis of the body" to make room for non-normative subjectivities and allow for a critical distance to identify ways in which certain social groups or individuals can be coerced, stigmatised or disenfranchised, as well as how the rhetoric and practice of techno-medicine continues to serve powerful interests. Here, radical care and reparations open up salutary gaps in the Western techno-medical hegemony.

For more information:
<https://art4med.eu>
<http://www.opensourcebody.eu>

**PHOTO
DOCUMENTATION,**

1/Xenology Preterrelations



In search for Lichens, Fieldnoting workshop at Waag Futurelab.
Photo: Florian Geerken



Lichen, Soil and Deep time, Fieldnoting workshop at Waag Futurelab.
Photo: Florian Geerken

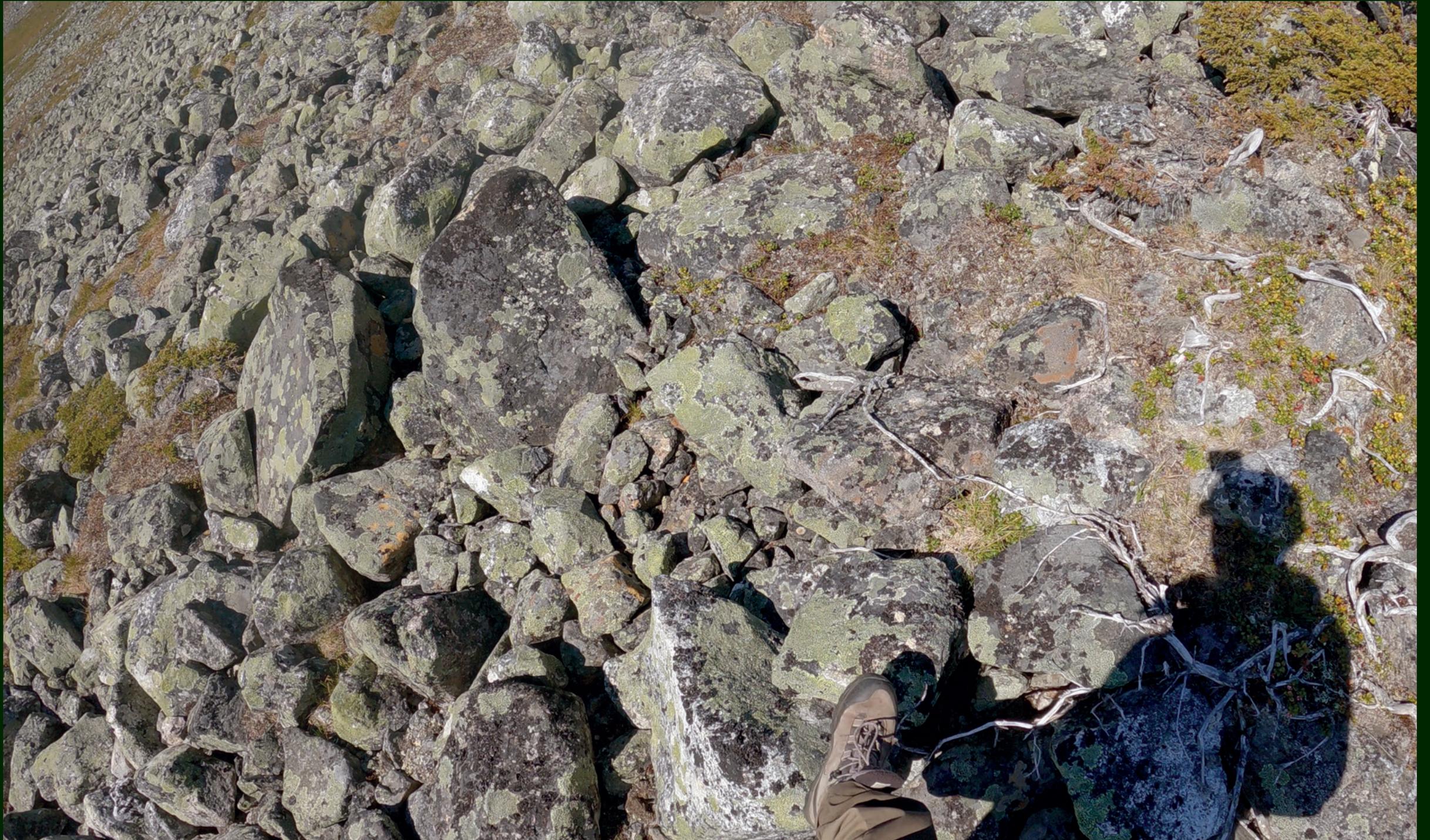


Fieldnote workshop, T-Factor, Amsterdam Science Park, 2021.
Photos: Florian Geerken

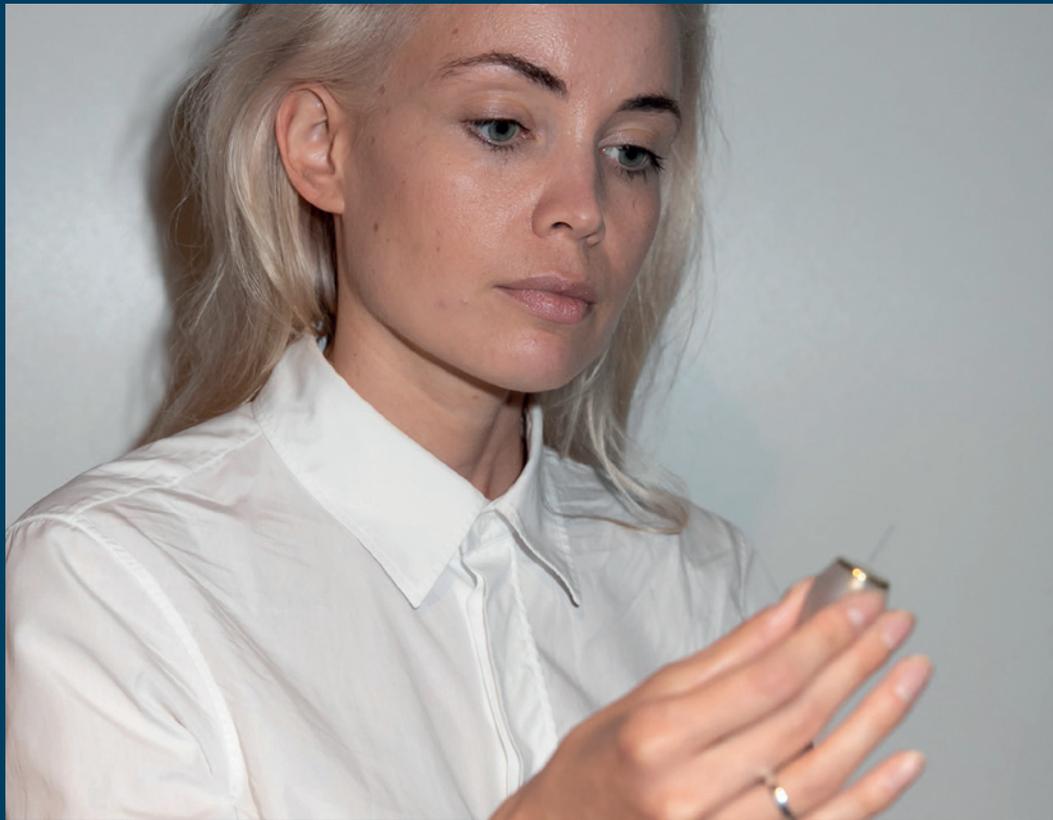


Writing letters to future lichens or other future species. Lichen, Soil and Deep time | Fieldnote workshop, T-Factor, Amsterdam Science Park, 2021. Photo: Florian Geerken

2/ MNEMONIA, Memories of the birds



Making of Mnemonia
Photo: Oula A. Valkeapää



**Emilia Tikka,
Photo: Vog Photo**

**Making of Mnemonia
Photo: Emilia Tikka**



**Oula A. Valkeapää
Photo: Antze
Greie-Ripatti**

3/ Quorum Sensing: Skin Flora Signal System

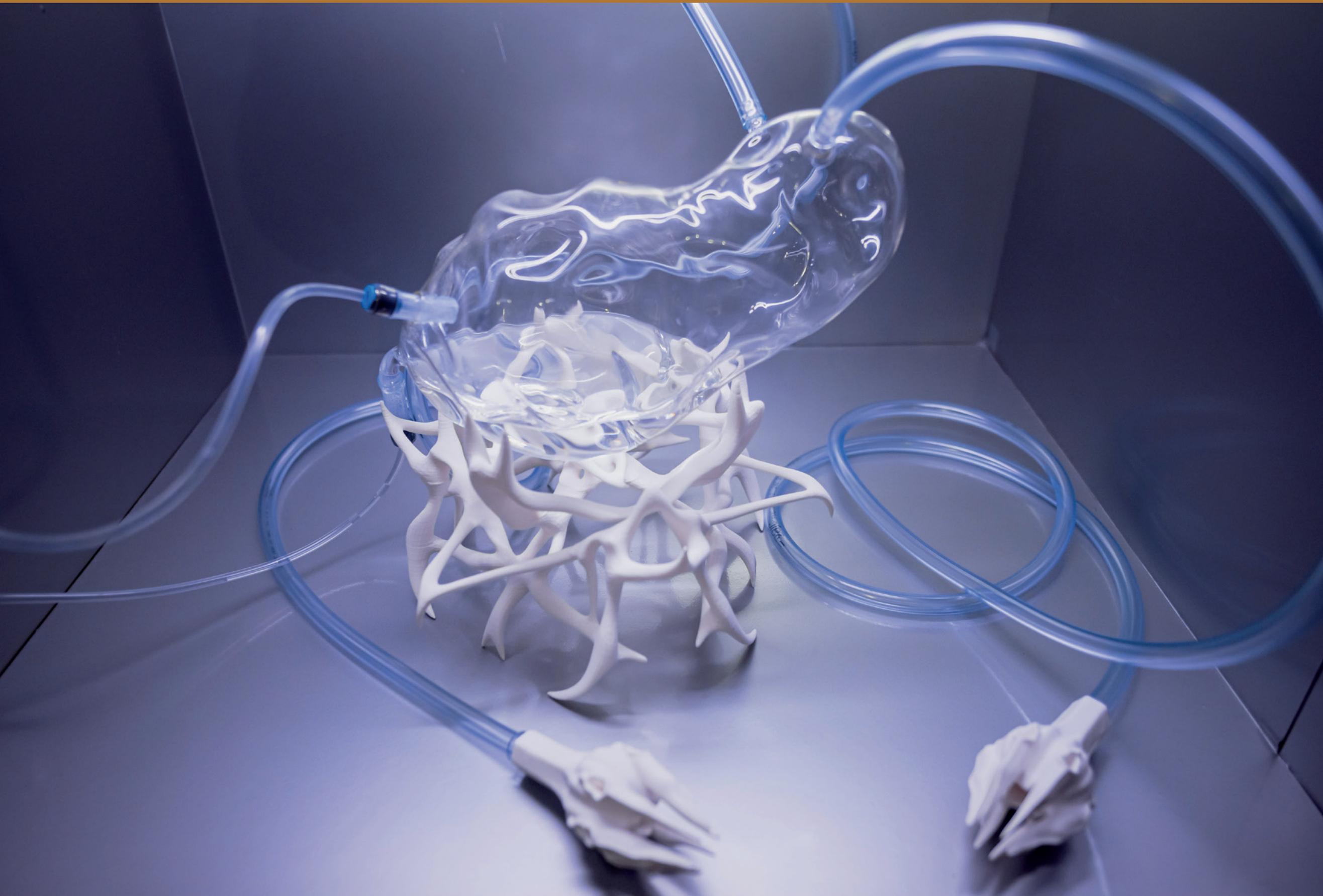


Glassmaker Zvonko Drobnič working on the glass vessels in his workshop. Photo: Simon Gmajner

Helena Nikonole and Lucy Ojomoko at the Biotechnical Faculty laboratories in Ljubljana. Photo: Simon Gmajner

Helena Nikonole and Lucy Ojomoko in front of their installation at Kersnikova Institute Photo: Simon Gmajner





**A segment of the Quorum Sensing exhibition at
Kersnikova Institute. Photo: Hana Jošić**

4/ UNBORN_oX₉

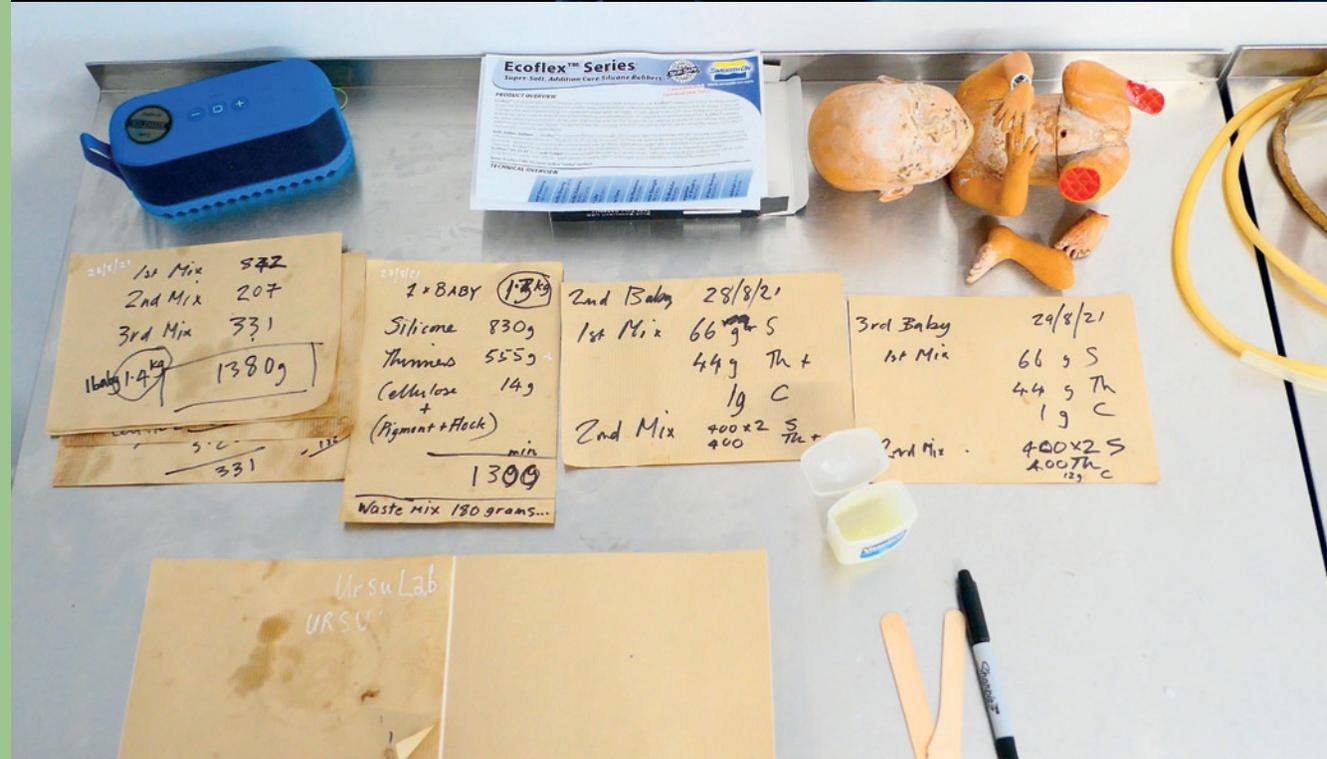
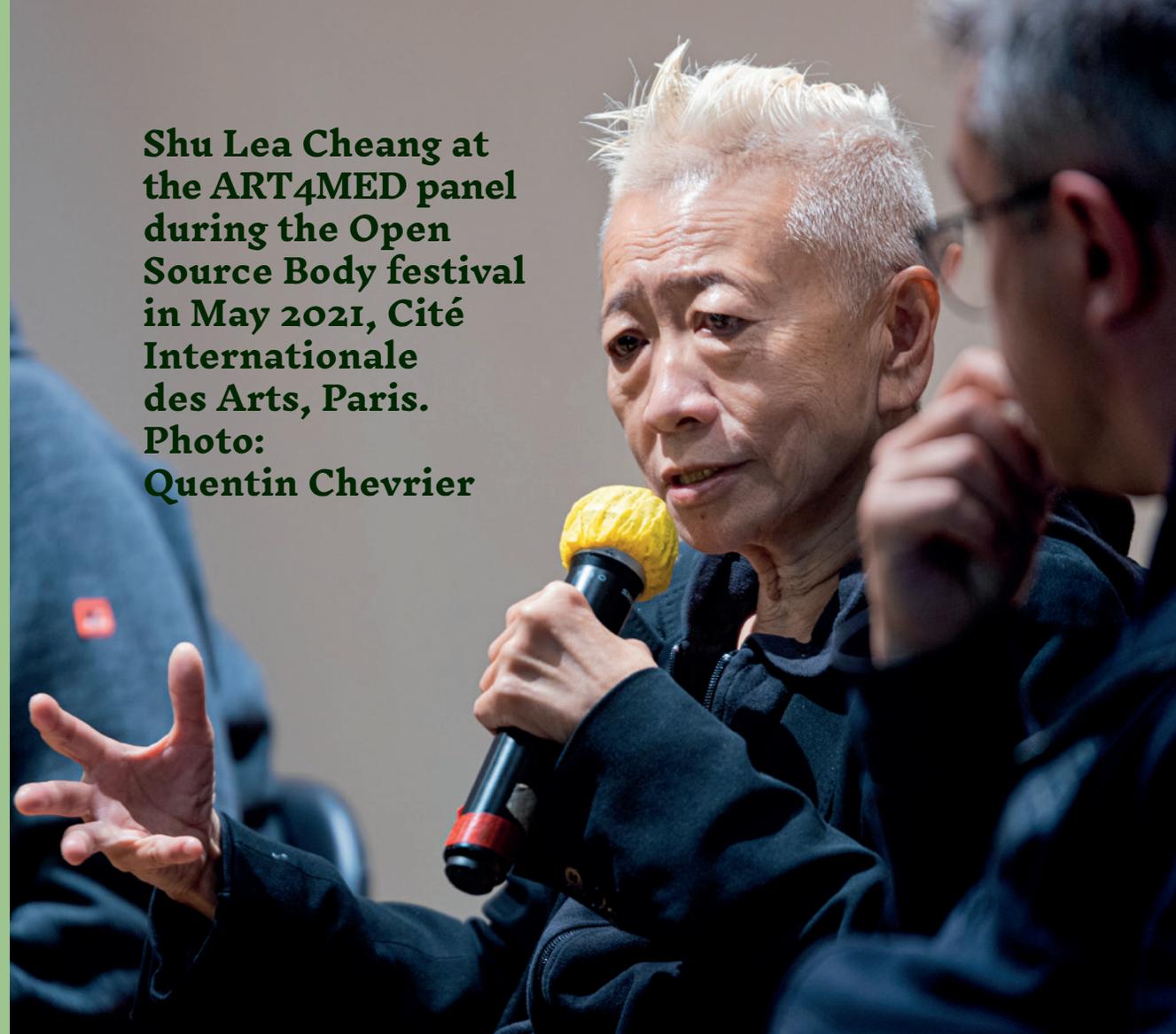
FUTURE BABY PRODUCTION



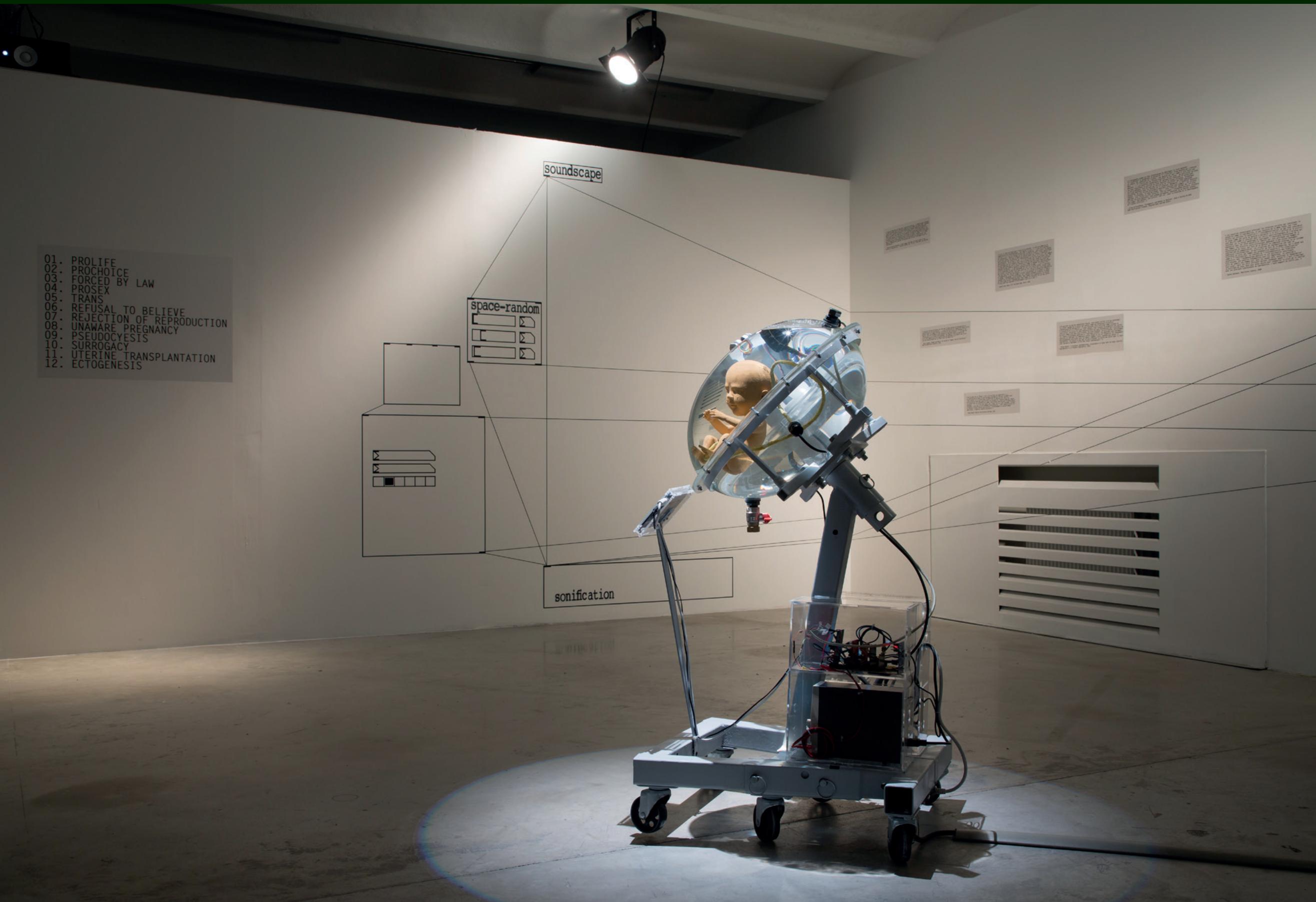
Jérôme Dubois (echOpen), Shu Lea Cheang and Thomas Demmer (Qastor) working on implementing the robotic art at thr34d5 biolab, Paris, December 2020. Photo: Ewen Chardronnet

Svar Simpson working on casting the fetal phantom at UrsuLab, Antre Peaux, Bourges, August 2021. Photo: Shu Lea Cheang

Shu Lea Cheang at the ART4MED panel during the Open Source Body festival in May 2021, Cité Internationale des Arts, Paris. Photo: Quentin Chevrier



Various recipes of echogenic material to cast the fetal phantom, UrsuLab, Antre Peaux, Bourges, August 2021. Photo: Shu Lea Cheang



01. PROLIFE
02. PROCHOICE
03. FORCED BY LAW
04. PROSEX
05. TRANS
06. REFUSAL TO BELIEVE
07. REJECTION OF REPRODUCTION
08. UNAWARE PREGNANCY
09. PSEUDOCYESIS
10. SURROGACY
11. UTERINE TRANSPLANTATION
12. ECTOGENESIS

**Unbornox9 at Chroniques Biennale,
La Belle de Mai, Marseille, January 2021.
Photo: Grégoire Edouard / SNZN Chroniques**

5/ m/other: Arts of Repair



**Readings and conversations,
Arts of Repair Symposia at the Center
for Arts and Mental Health, June 2022
Photo: Andrea Pontoppidan**

**Installation shot from the exhibition
m/other at the Center for Arts and Mental
Health, October 2021. The immersive
artwork is titled 'Gentleness Activist
Resting Space' and is created by Sidsel
Heldén, Anna Rieder and Olivia Lund.
Photo: Amanda Bødker**





Installation shot from the exhibition m/other at the Center for Arts and Mental Health, October 2021. The immersive artwork is titled 'Gentleness Activist Resting Space' and is created by Sidsel Heldén, Anna Rieder and Olivia Lund. Photo: Amanda Bødker

CREDITS,

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ART2M / Makery
Waag Futurelab
Bioart Society
Laboratory for Aesthetics and Ecology
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