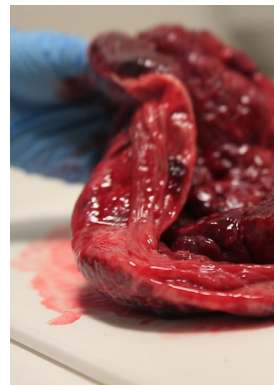
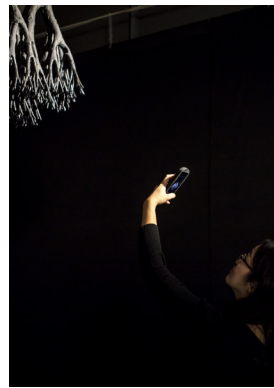
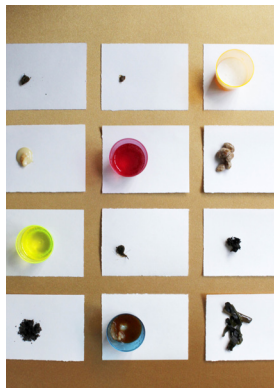
The background of the entire image is a detailed, high-magnification microscopic view of biological tissue, likely an epithelial layer. It features a complex network of cells with dark, irregular outlines and a lighter, textured interior, creating a dense, interconnected pattern. The overall color palette is dominated by shades of blue and purple, with some darker, almost black, lines defining the cell boundaries.

**BIO ART
& DESIGN**
2014-2016

BIO ART & DESIGN

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Bio Art & Design Award: 2014-2016

The Bio Art & Design Award (BAD Award; until 2013 called the Designers & Artists 4 Genomics Award) is a unique competition aimed at stimulating young artists and designers from The Netherlands and abroad to experiment with bioart and design and to collaborate with renowned Dutch science centres. The Awards of €25,000 each are assigned by an international jury to the most promising and original proposals in the competition. The projects are consequently realised within six months and exhibited at MU artspace in Eindhoven. This successful initiative has been a joint effort of ZonMw (Medical Research Council), NWO (Dutch Research Council), Waag Society, BioArt Laboratories and MU artspace.

Each year approximately 50 artists and designers, from all over the world, enter the competition. The young artists and designers who win this competition often get a head start in their artistic careers. A recent study on the impact of the BAD Award by Naomi Lagerweij found that the award helped previous winning artists and designers to develop their practice, to expand their personal professional network and to engage in new science collaborations. The BAD Award also provided them with many opportunities to exhibit their work internationally, and there are even examples of projects winning other prestigious awards. Many artists, designers and scientists still actively work together or stay in touch with each other.

The close collaboration between artists, designers and scientists did not only lead to new artistic explorations, but impacted the science as well. Previous winning scientists reported that participating in the BAD Award resulted in new ways of thinking and new research questions. The collaboration between the artists, designers and scientists also stimulated the development of new tools, technologies and methods. For example, Lilian van Daal and Roos Meerman developed novel 3D printing methods and materials for their project Dynamorphosis; and Katharina Unger and Julia Kaisinger worked with professor Han Wösten on growing edible fungi on toxic waste.

The notion that art-science collaborations are fruitful and also provide a much needed cross-over for innovative approaches gains territory in The Netherlands. Over the past years we have noticed an increased interest in art/science collaborations in the Netherlands. Recent examples include the SynCity film and art festival about synthetic biology at Wageningen University and the Zero Footprint Campus at Utrecht University. Abroad initiatives like the Biodesign Challenge at the Museum of Modern Art in New York thrive. It is wonderful to see these developments and to be a part of it.

This magazine presents the works resulting from nine collaborations between young artists or designers and Dutch scientists working in the Life Sciences. They received the BAD Award between 2014 and 2016. The winning projects explored a wide range of scientific topics and disciplines, ranging from fungi and viruses, to ecological science and neuroscience.

We hope to see many more interesting projects in the future!

Wilma van Donselaar
Manager cluster Life Sciences & Health - ZonMw





NAVAL GAZING
Špela Petrič

Royal Netherlands Institute for Sea Research

The project Naval Gazing, developed in collaboration with prof. dr. Klaas Timmermans, considers the relationship between biotic marine entities, the human, and the sea at a time when natural resource depletion and climate change are pushing towards an agricultural exploration of the sea, and the distinction between nature and culture is becoming more and more irrelevant. Striving towards a poetic synthesis of critical theory and technological achievements, this simple passive structure embodies the chaotic power of water and wind dynamics, irreconcilable with the notion of control that has become the standard of human technoscientific practice.

The habiton is a kinetic art-machine which simultaneously acts as a platform for the attachment of organisms, creating a travelling, unpredictable transient biotope in the North Sea. It has become a true example of how non-human architecture unravels through time, as the colonization of the structure gradually breaks its symmetry, causing it to transform from a human-conceived kinetic architecton into an immobilised, utilized and eventually sunken micro-ecology formed around the habiton. The artwork is killed by nature, leading us to pause and consider our reification and desires posed towards the oceans.

Since the Award

Naval Gazing kicked off a series of opportunities which lead Petrič to receive the 3Package Deal scholarship awarded by the Amsterdam Fund for the Arts. Because of this, Petrič stayed in the Netherlands for an additional year, gradually building a network of colleagues and institutions with whom she continues to collaborate on different projects, most tightly with Waag Society. Since then, Petrič has realised the award-winning Phytoteratology in collaboration with Sylvius Laboratory, Leiden University and Zone2Source; Miserable Machines, which was commissioned by MU for the Matter of Life exhibition; Skotopoiesis and Strange Encounters at Kapelica Gallery in Ljubljana, two projects addressing the plant-human relationship. She has also been part of the Trust Me I'm An Artist program and FEAT - Future Emerging Art and Technology.





**THE ECONOMICS OF EVOLUTION:
THE PERFECT PIGEON**
Patrick Stevenson-Keating & Isobel Goodacre
Centre for Ecological and Evolutionary Studies, University of Groningen

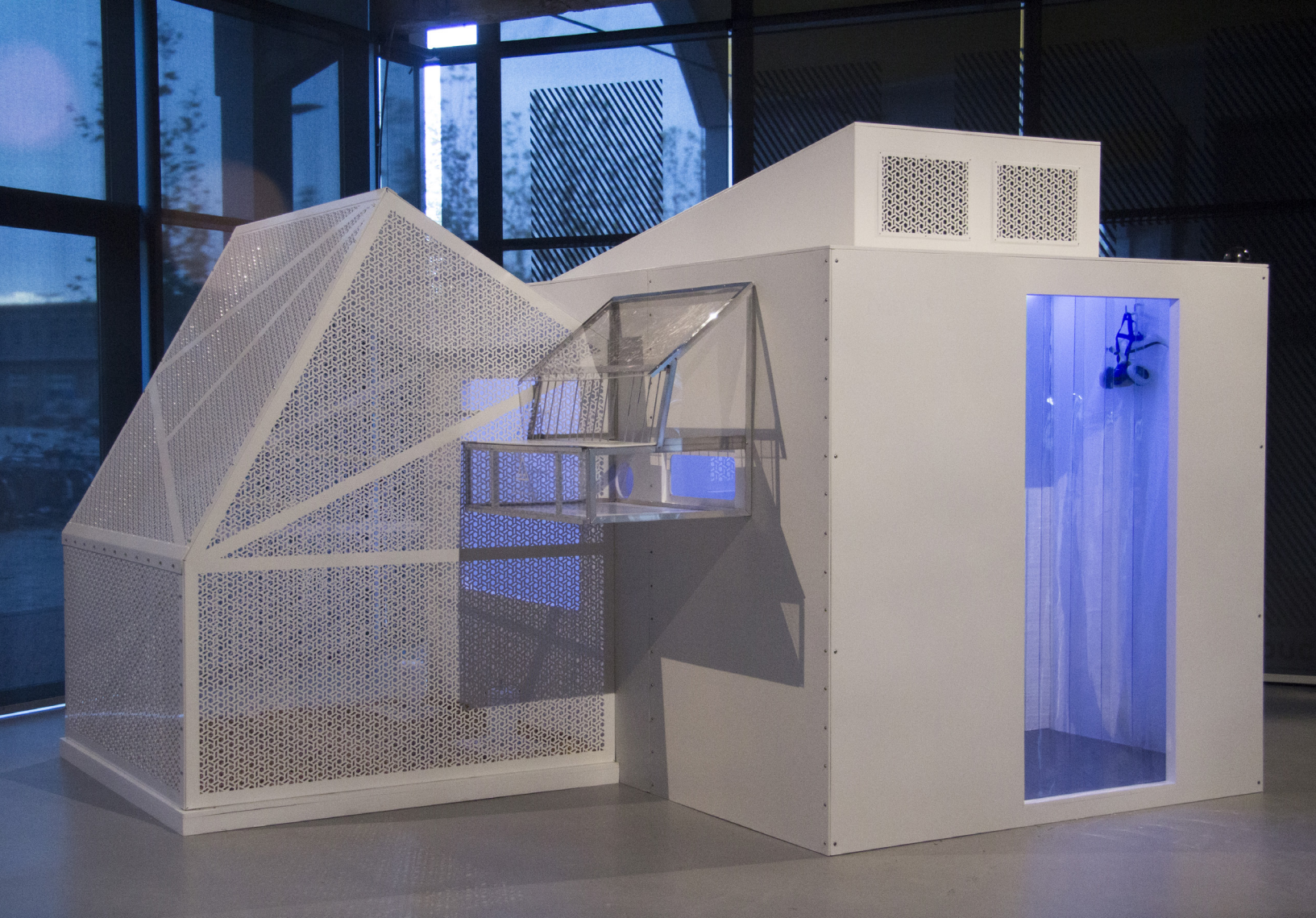
The Economics of Evolution, developed in collaboration with prof. dr. Jan Komdeur, is a speculative design project exploring the commodification of biological information, and how this could shape the evolution of natural organisms. Set within the context of the booming Indian biotech and pharmaceutical industry currently experiencing increased competition for patents and increasing antibiotic resistance, the project looks at how economic pressures, more than environmental ones, may overwrite the natural selection of a species.

The symbiotic relationship between pigeons and humans became the focal point of the project; exploring the potential use of racing pigeons as tamper proof, biological couriers - used to send the most valuable data 'off-line' in an age where privacy and cybercrime are ever evolving economic threats to industries worldwide. After randomly sampling the biometric data of over 1000 birds belonging to the top pigeon racing teams in the Netherlands, Belgium and UK, the team compared biometric data with the racing performance of the birds sampled. This final data set was used to begin to build a picture of what the ultimate pigeon 'design' may be to fly a specific route between two fictional pharmaceutical companies within the narrative.

Since the award

Since the Matter of Life exhibition at MU in 2014, The Economics of Evolution was exhibited by Science LinX, an outreach programme at the University of Groningen, for the 2015 Night of Art and Science. Studio PSK, the creative studio of the two designers, has also continued to take a collaborative approach to many projects, working with a broad spectrum of experts in specific fields of science and design since the award.









FUNGI MUTARIUM

Julia Kaisinger & Katharina Unger

Department of Microbiology, Utrecht University

Fungi Mutarium is a prototype that grows edible fungal biomass, mainly the mycelium, as a novel food product. Fungi is cultivated on specifically designed agar shapes that the designers called 'FU'. Agar is a seaweed based gelatin substitute and acts, mixed with starch and sugar, as a nutrient base for the fungi. The 'FUs' are filled with plastics. The fungi is then inserted, it digests the plastic and overgrows the whole substrate. The shape of the 'FU' is designed so that it holds the plastic and offers the fungi surface to grow on.

The idea behind the Fungi Mutarium is that food production has to be revolutionized and more technologies are needed to farm under extreme environmental conditions. Scientific research has shown that fungi can degrade toxic and persistent waste materials such as plastics, converting them into edible fungal biomass. The designers, together with prof. dr. Han Wösten, worked with fungi named Schizophyllum Commune and Pleurotus Ostreatus. These fungi are found throughout the world and can be seen on a wide range of timbers and many other plant-based substrates virtually anywhere in Europe, Asia, Africa, the Americas and Australia.

Photography by Paris Tsitsos



Since the award

Livin Studio, the collaborative design development office of the two designers, has received the prestigious Braun Prize 2015 Sustainability Award for the project Fungi Mutarium. Fungi Mutarium was chosen as the winner from more than 2,500 submissions from 67 countries. Since then, Livin Studio has concentrated on their insect farming project which turned into a new company "Livin Farms". With Livin Farms, they have developed the world's first desktop farm for growing edible insects as a sustainable and nutritious food source in your home.



DRONES WITH DESIRES

Agi Haines

Department of Neuroscience, Erasmus MC

Drones with Desires is an interactive art installation that considers how the structure of the brain might change if it was placed in another body. The collaborative team, led by dr. Marcel de Jeu and dr. Jos van der Geest, made a machine that could learn using a digital version of a brain's neural structure, an artificial neural network, and change this network as it learnt over the duration of the exhibition. The artificial neural network was based on the artist's brain data.

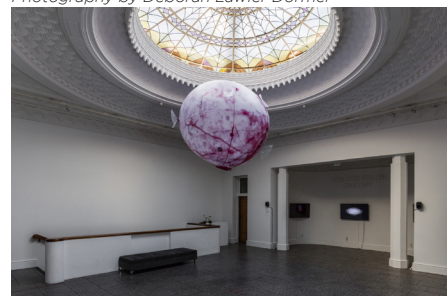
The machine, a drone, makes decisions based on comfort and curiosity, moving its wings to navigate.

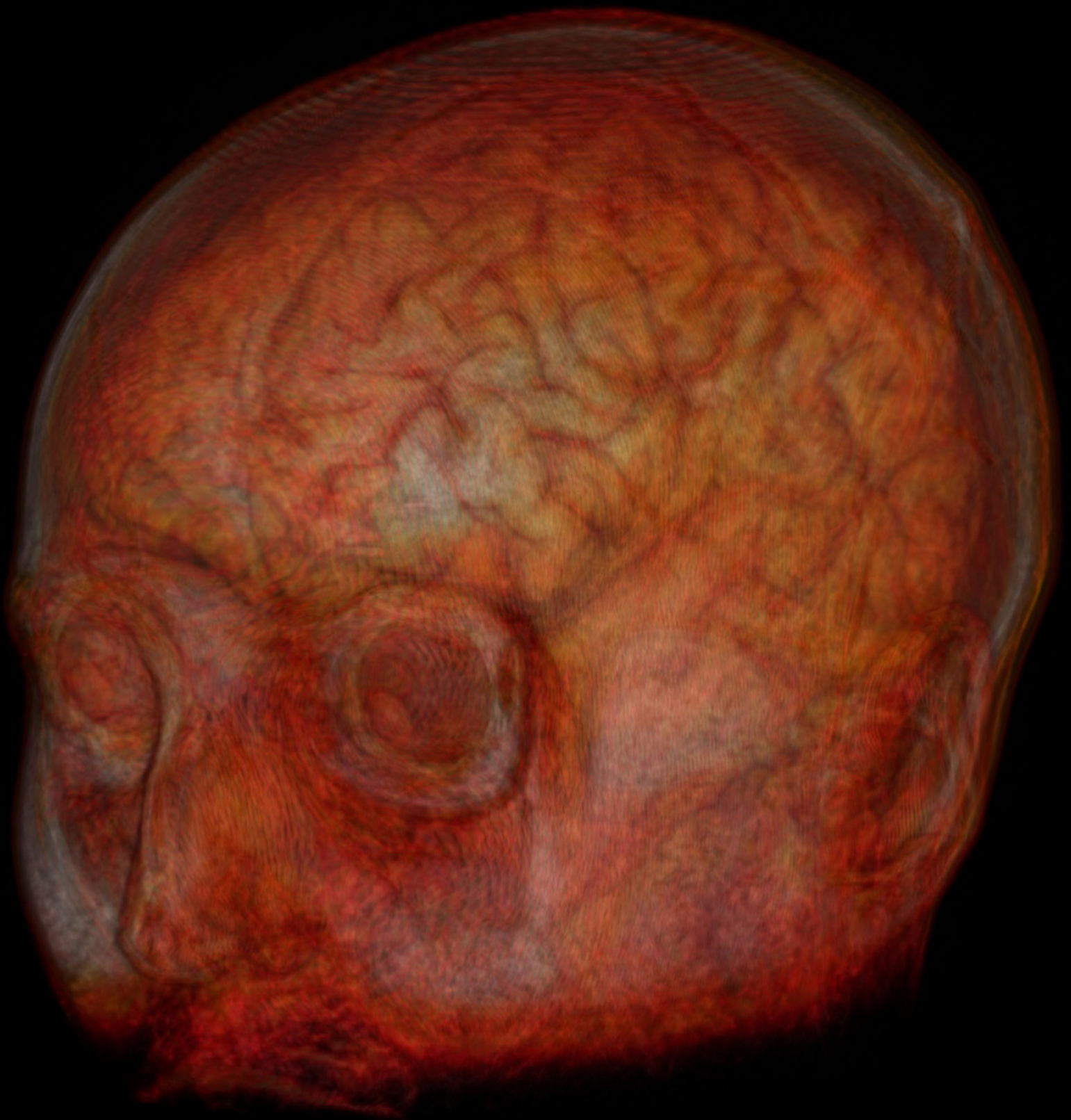
As it does so connections in the network alter their strength to replicate learning behaviour as it develops in the human brain. As the drone learns, the network updates telling us how the plasticity of the brain might change if it was in a completely different anatomical structure. This drone is therefore a developing and morphing portrait of the artist's brain affected by its body and environment. As some theorise that we are the sum of our neural networks, it is questionable if the drone is acting out the desires of the particular brain it is based on, or if its motion is at all indicative of a sense of awareness.

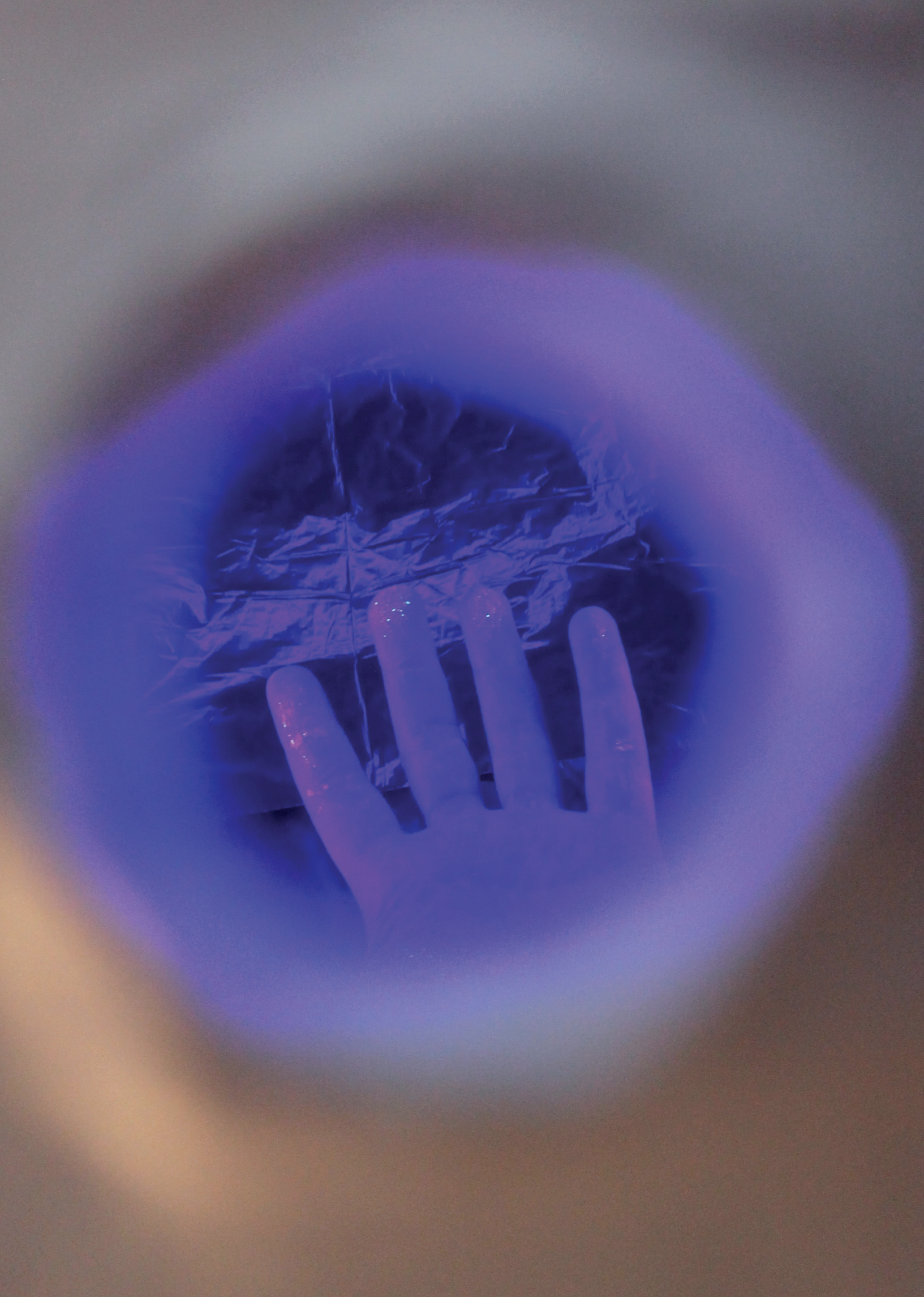
Since the award

Since exhibiting Drones with Desires at MU Gallery Eindhoven this work has been exhibited at the Gus Fisher Gallery in New Zealand, Off the Lip in Plymouth and Digital Asia Hub in Hong Kong. The drone has also been presented in a number of talks internationally and members of the team have continued to work together and invite new collaborators, being awarded first prize for Hack the Brain 2016. Haines has continued to exhibit work, a selection of which being at the ArtScience Museum in Singapore, WEF Dalian in China, Stedelijk in Amsterdam, and had residencies with Waag Society, Mediamatic and VU University as well as Etopia, Spain. She is currently working on her PhD in Transtechnology Research and CogNovo in Plymouth..

Photography by Deborah Lawler Dormer









THE MICROBIOME SECURITY AGENCY (THE MSA)

Emma Conley

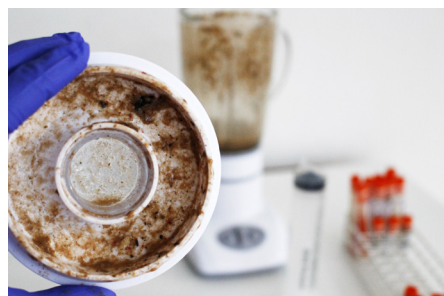
Microbiology & Systems Biology, TNO

The Microbiome Security Agency (The MSA), developed in collaboration with dr. Guus Roeselers, investigated the future of microbiome privacy issues with the aim of preparing citizens for a future where our personal information is at risk through our biological datasets. Empowering citizens to secure their own data, The MSA researched and prototyped future scenarios, systems, products and processes for choosing your own microbiological privacy settings. The MSA ran experiments in tracking, destroying and obscuring the microorganisms that live in and on our bodies.

Drawing from these experiments and prototypes, The MSA created a Community Bacteria Bank which enabled citizens to invest in the protection of their biological privacy. The project experimented with 'obscuration by anonymization' by creating an 'obscuration solution' that would anonymize the bacteria on a user's skin by essentially adding noise. Citizens donated samples of bacteria-filled items and MSA agents blended them into a unique synthetic ecosystem of bacteria. The DNA from this mix was extracted and amplified, creating a DNA solution that could be applied to the skin. These DNA 'obscuration solutions' enable investors to select their own microbiological privacy settings.

Since the award

Since completing The Microbiome Security Agency project in 2015, Emma has been a full time member of the Office of Life and Art, working on projects relating to food, agriculture, biotechnologies, and climate. She has completed works throughout Europe, the United States, and Asia, functioning as an artist, designer, producer and researcher with the artist-led think tanks the Center for Genomic Gastronomy and CoClimate. She has recently worked on exhibitions, events, dinners, installations and publications, collaborating with institutions like the World Health Organization, Institute for the Future, Science Gallery Dublin, Kew Gardens, Jeu de Paume, and MediaLab-Prado.





THE ART OF DECEPTION
Isaac Monté

Department of Ecological Science,
 VU University Amsterdam

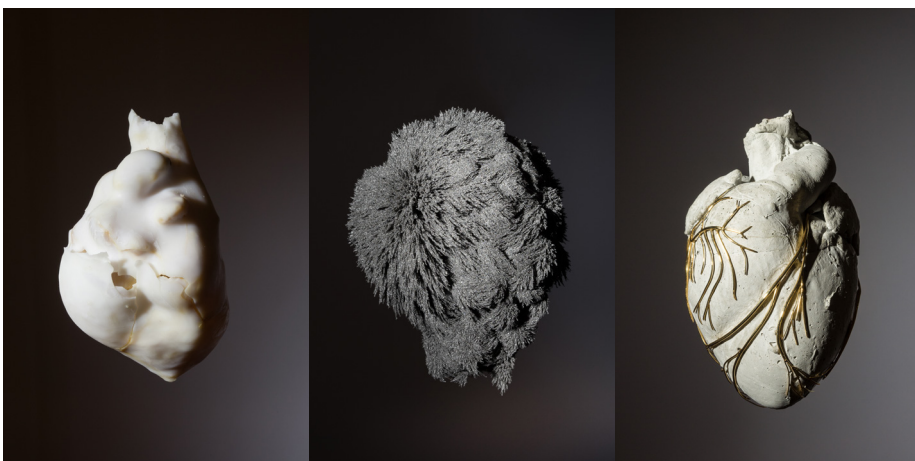
Humans use deception to achieve perfection in society, art and science. Reacting to this through art, Isaac and prof. dr. Toby Kiers took 21 discarded pig hearts and transformed them into aesthetically improved hearts for humans by decellularizing them and re-populating them with various techniques. Decellularization marks a new era of synthetic biology - organs are stripped of their cellular contents, leaving behind a sterile scaffold that can be repopulated with stemcells. While the medical utilization of this

resource is being realised, the artistic and creative value of ghost organs represents unexplored territory. The Art of Deception explores how biological interventions and aesthetic manipulation can be used as tools for the ultimate deception: the transformation of inner beauty, from grotesque to perfect. Can the ghost organ be a blank canvas for designers? Can organs be objects of design? Will humans be able to manipulate organs for aesthetic purposes? The discarded dead hearts will not function as canonical organs, but rather as a representation of how far science can go to manipulate the human body.

Photography by Hanneke Wetzer (above) and Monica Monté

Since the award

Since the Award, Isaac has been exhibiting the project almost non-stop at a variety of exhibition spaces in different countries, from Mediamatic in Amsterdam, to Salone del Mobile in Milan, and the showroom of Volkswagen in Berlin as part of the Ars Electronica Exhibition. Isaac is also working on a European project called Food Heroes which challenges designers to collaborate with farmers to find solutions for their waste streams. For this project he has been collaborating with a variety of scientists that have participated in the Bio Art and Design Award over the past years. He is currently translating the waste from the production of leek into a packaging material, and working on a self-initiated project, growing crystal objects from minerals.









DYNAMORPHOSIS

Lilian van Daal & Roos Meerman

Swammerdam Institute for Life Sciences, University of Amsterdam

Dynamorphosis merges the invisible biological process of the body with 3D printing, with attention to biology's ability to self-assemble, transfer substances, and maintain equilibrium. The designers, in collaboration with dr. Renee van Amerongen, developed and used novel materials and methods to create three 3D printed, kinetic objects. *Lactility* is one of the first physical 3D visualizations of breast tissue. Using a 3D print technique that allows the production of thin-walled, narrow tubes, they were able to construct an intricate network of passageways for the directional transport of liquids. *Elabricate* represents the lungs.

Lungs are extremely structured and are composed of so-called fractals, mathematical patterns that repeat themselves at every level, resulting in a maximized surface area. The complex balloon, made by using 3D printed moulds, changes its volume in response to air pressure. *Transorb* represents the intestine, an organ capable of transporting food by means of peristaltic movements. Pulsating rather than continuous movements allow the efficient use of energy. Short, vertical 'muscles' transfer their pulses to elongated, horizontal 'muscles', resulting in a smooth, propelling motion. By 3D printing on flexible materials, like textile, a pulsating movement is transformed into a continuous movement.

Photography by Hanneke Wetzer



Since the award

After the exhibition at MU artspace in 2016, Dynamorphosis was exhibited at the University Museum Utrecht, and during the second half of 2017 exhibited at the University of Amsterdam. Lilian and Roos are still collaborating with the Swammerdam Institute in a follow-up project in which they are investigating the educational value of 3D anatomy objects for students to better understand movement and transformation in organs. They are also further developing the diverse techniques and materials which they explored during the Dynamorphosis project to apply them in the production of new, durable and sustainable products. The technique that has been used to develop the intestine object will be further developed for the making of shoes.



HAEM
Cecilia Jonsson

The Netherlands Cancer Institute, Antoni van Leeuwenhoek Hospital

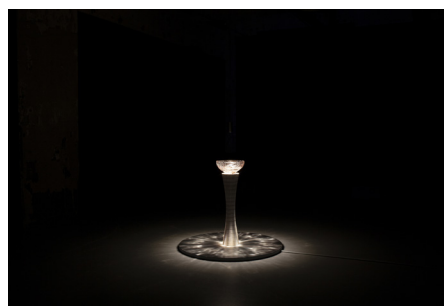
The physical basis of Haem is iron derived from an unexpected source, the human placenta. Although this transitional organ possesses a complex labyrinth of blood vessels, the placenta provides a direct connection between mother and developing child. Iron, plentiful throughout the process of exchange, plays an essential role, moving through this 'maze',

guiding oxygen from the mother to the foetus. To symbolize this directed movement, a compass needle made out of metallic iron derived from donated human placentas was created. Haem reflects on the transformation of maternal resources into valuable personal processes, and on their power to direct us throughout life in the decisions we make, and directions we take, ultimately shaping who we are and the world we live in.

Haem is exhibited as an installation with the compass apparatus floating

in the midst of a custom-made glass bowl inspired by cross-sections of microscopic imaging of the placenta. Accompanying the installation is a sound composition and a selective archive about the process, shown as wall-mounted vinyl letters that record the birth date and weight of the 69 donated placentas, and a HD Video that provides insight into the project.

Photography by Cihad Caner and Signe Tørå Karsrud (under left and page 19)



Since the Award

Since the exhibition at MU artspace in 2016, Jonsson and dr. Rodrigo Leite de Oliveira from the Netherlands Cancer Institute have continued their successful collaboration, and Haem has been presented in several lectures and exhibitions in Porto (Portuguese Pharmaceutical Society), Amsterdam (FIBER Festival), Bergen (Haukeland University Hospital's old children clinic) and Utrecht (University Museum Utrecht). Haem was also included in

the exhibition Blood: Life Uncut at Science Gallery Melbourne and Science Gallery London. Additionally, Haem received an Honorary Mention in the Category of Hybrid Art of The Prix Ars Electronica 2017 and has been exhibited at The Ars Electronica Festival's CyberArts exhibition, Archive in Linz.







TAME IS TO TAME

Pei-Ying Lin

Viroscience Lab, Erasmus MC

Tame is to Tame rethinks the distance humans should have with viruses that cause infectious diseases, and particularly viruses that do not have vaccines yet, such as the Norovirus. Tame is to Tame is a training program designed by the very first two virus tamers in the world – artist Pei-Ying Lin and dr. Miranda de Graaf. The virus-taming program is built upon virology research and shows people an alternative way to look at the invisible and inanimate viruses, which we consider as enemies, and illus-

trates how these ‘agents’ can redefine the cultural definition of human and individualism. The tamers are asked to make conscious decisions on the topic of human - virus - nature relationships, and learn to consider the human community as a herd instead of individuals. The project is a mixture of manifesto, dance, exercise, games, and tea that simulates sickness. Each stage of the tamer’s training programme asks the tamer to position himself/herself in a different physical and psychological distance from the virus as if the human is dancing a ‘conceptual dance’ with the invisible viruses to explore the possibility of co-existence.



Since the Award

Tame is to Tame has been exhibited at the University Museum Utrecht, Digital Art Centre in Taipei and Yiri Art Space in Taipei. The project is also exhibited in the PlayDesign Hotel in Taipei where guests can spend a night with the project to role play as the virus tamers. Since the award, Pei-Ying Lin has obtained a residency at Waag Society and has been researching the topic of symbiosis between humans

and viruses in relation to food, and has started a joint residency with Waag Society, University of Amsterdam, and Mediamatic. She is also working on developing workshops that probe into cultural differences around the east and the west through the topic of human symbiosis with microbes and viruses.



BADAWARD

**Bio Art & Design
Award**

Artists and designers who want to be at the forefront of riveting art that is transdisciplinary and pushes the boundaries of technological and artistic possibilities, are welcome to submit their application for the Bio Art & Design Award and take a chance on winning €25.000 for their project!

The competition highlights and explores the exciting and novel possibilities between design, artistic practice and Life Sciences. It aims to stimulate emerging designers and artists to delve into the world of bio art and bio design, and produce new work in close collaboration with the most prestigious Dutch research groups in the field of health, bio-informatics, sustainability, food, agriculture, horticulture, water, climate.

Did you graduate no longer than five years ago in the field of art or design? Do the breakthroughs in the life sciences fascinate you, and do you have a talent for (applied) arts and/or design? Then we invite you to send in your CV, portfolio and idea for a project that combines artistic merit with the vast developments in life sciences.

Find more information on www.badaward.nl

Colophon

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