

**SHARED GARDENS
JARDINS PARTAGES**

**Making the Invisible Visible:
Program for an exhibition**

**CONNECTED OPEN GREENS:
elements of a garden**

CONNECTED OPEN GREENS: ELEMENTS OF A GARDEN

Keywords: bacteria, fungi, soil, plants, fruits & berries, biodiversity, laboratorium, observatorium, greenhouse

CONCEPT

I propose to create a *poetic observatorium* that is studying the primary elements of a garden and that is exposing and clarifying the links between the visible and the invisible. I want to show that our gardens are ecosystems where all elements, micro-organisms and plants, the biotic and the a-biotic are connected.

This *observatorium*, titled '*Connected Open Green*' will take the form of an installation with the aesthetics of a laboratorium. Ideally, it would be presented in a glass greenhouse inside the building of Magasins Generaux. The experiments that I will set up in the observatorium will be in a constant process. They will explore the interface of biological sciences and art to envision new sustainable materials and forms of production for the future. Can we grow our own materials? Can we create together with living organisms as plants and bacteria? The exhibition visitors and the inhabitants of the Pantin neighborhood can observe the progress and learn from the experiments. As well can they participate in the open workshops proposed by the artist.

BACKGROUND

Since more than 25 years, Nature is the major component of my artistic research. Together with colleague artists, engineers, gardeners and volunteers I created and studied many different garden setups, ranging from rooftop gardens, wild weed gardens, guerrilla gardens, community gardens, foodforests, vegetable gardens, plant guilds compositions, connected gardens, Open Greens, seedbanks and open air labs. I organized many different workshops, designed databases with Open Greens data collections, studied (rain)water management, did supplementary studies to get a degree as herbalist and became gradually a rooftop garden specialist. As a dedicated beekeeper and as a naturalist studying bee behaviour for some decades, I notice every day, every season and every year that everything is connected, more than we think so. Every element, from micro to macro, organic to anorganic, from the single cell bacterium to the more complex beings belonging to the animal kingdom, every element has its importance. Therefore it is crucial to learn more about the 'unknown', about the 'invisible'. That is why it is also necessary to realize that we humans are not at the top of the pyramid but that we are only a (specific) link in the circle of life. As Donna Haraway put it: 'Nobody lives everywhere; everybody lives somewhere. Nothing is connected to everything, everything is connected to something.'¹

We have to move into collective thinking!

PRACTICAL

In a prefab-greenhouse, a garden observatorium will be set up. Over the duration of the exhibition, we will observe the usually invisible but important elements that are necessary for the arrangement and prosperity of a garden. We will do this by designing a series of simple experiments that will be carried out in glass containers and that will be presented on laboratorium tables inside the greenhouse. Inhabitants and Public can participate by carefully observing the developments and changes and by making fieldnotes in the garden/laboratory notebook over time². We will work at the intersection of art and biology and new ways of making informed by bio-fabrication, botany and biomimicry. The experiments will range from culturing cyanobacteria in petri dishes and Erlenmeyer flasks; monitoring the local soil biodiversity with Winogradsky column experiments; observe with a microscope the diverse micro-organisms at work in compost and understand their importance in the biodegradation of organic material; grow mushrooms, study their rhizomatic root system and learn about the possibilities this offers to create recycable eco-material; observe the root system of plants and study which minerals they need for a good development; learn about the links between pollinating insects and plants; make new materials with products from the garden: create organic textiles based upon fermentation processes, make bioplastics from fruit pulp, color textiles with natural and vegetal dyes from plants raised in our city- and rooftop gardens.

The public will be able to observe all these processes in detail with small microscopes and through glass jars and containers. Recurrent visitors (neighbours, inhabitants of Pantin) will be encouraged to make pictures and to note down their observations in our garden logbook.

If the outline of the exhibition permits the possibility of workshops, the artist can, in consultation with the curators, set up (one or more) workshops where visitors can learn, in a hands-on format, how to make bioplastics; vegetal leather (bacterial cellulose); raise mushrooms; culture micro-algae for pigments, ...

A more moodboard and accompanying budget, is outlined on the following pages.

¹ Donna Haraway, *Tentacular Thinking: Anthropocene, Capitalocene, Chthulucene* (2016)

² Annemarie Maes, *Connected Open Greens Catalog vs.1.0* (2010)

CONNECTED OPEN GREENS: ELEMENTS OF A GARDEN

The following pages show some moodboards (all photos ©annemarie maes), sources of inspiration for the installation that I propose for the Shared Gardens exhibition. In my *Connected Open Greens Observatorium* that I would like to install in les Magasins Généraux, I will study the invisible and visible treasures that I bring back from from (city)Nature, the same way a naturalist studies his/her samples collected during voyages of discovery. The Connected Open Greens Observatorium will become a naturalistic Cabinet of Curiosities with a focus on materials for the future. In my own words:

'In my Open Greens Observatorium I work with a range of biotic and abiotic elements. I view my lab as an open environment for experimentation, a space for contradiction, criticism and evaluation. I combine organic components with living systems such as fungi and bacteria to create artifacts for the future. My micro-organisms grow biofabrics and I research how more sensorial qualities can be implemented in these membranes via living technology. My samples and objects can be classified as 'Future Archaeology': fragments of a Forgotten World as well as fragments of a World To Come.'



ROOFTOP GREENHOUSE

Fig.1: Top - Greenhouse in the rooftop garden, wild flowers;
Fig.2: Bottom - vegetable beds in rooftop garden;

Unless I will change the outside (rooftop) for the inside (exhibition hall), I would like to use for my contribution to the Shared Gardens exhibition the inspiration and the experience I have gained during the years that I grow herbs, vegetables and fruits in my rooftop garden in Brussels. My Open Air Laboratorium, constructed along the principles of a forest garden where the plant guilds in the different layers develop in symbiose with each other, also hosts several beehives, ideal to study the relation of pollinating insects and plants in urban gardens.

More information about my politics of change, about my gardens, the how-to's and why's can be found on my research wiki, links below.



[Links on website:](#)

<https://research.annemariemaes.net/doku.php?id=urban-artfarm-2012>
<https://research.annemariemaes.net/doku.php?id=urban-artfarm-2013>
<https://research.annemariemaes.net/doku.php?id=urban-artfarm-2014>
<https://research.annemariemaes.net/doku.php?id=urban-artfarm-2015>

LABORATORIUM AESTHETICS



Fig.1: Top - *Laboratorium table (part of the installation) in 'Eco-Visionaries' at Laboral, Gijón (es)*

Fig.2: Middle – (part of the) *Presentation 'Intelligent Cities' at MAAT (museum for Art, Architecture & Technology).*

Fig.3: Bottom – *Bozar Brussels, Generation Z*

The images to the left are an example for the 'feel' of the *Laboratorium Aesthetics* that will be applied for the installation *Connected Open Greens*.



I have a collection of metal tables and pedestals, all mounted following similar 'open structures' principles.

I would like to construct similar hardware elements in the *Connected Open Greens* Observatory, to create an installation which consists of a multitude of small experiments, possibly set up in collaboration with local inhabitants.

Observing compost degradation by micro-organisms (compost brought in by local inhabitants); set up soil diversity observation test with mud and water from L'Ourcq; grow our own mushrooms and make eco-material out of the mycelium rhizomes; ferment products of the garden into new organic fabrics and bioplastics, ...

Possibly, the installation can be accentuated with some (small) Scanning Electron Micrographs (mounted on aluminium support) that I made from pollen grains and dissected honeybees.



[Links on website:](#)

<https://annemariemaes.net/presentations/bee-laboratory-presentations-2/2019-eco-visionarios-at-laboral-gijon-spain/>

<https://annemariemaes.net/presentations/bee-laboratory-presentations-2/2018-for-a-brave-new-brussels-at-maat-lisbon/>

OBSERVING CYANOBACTERIA

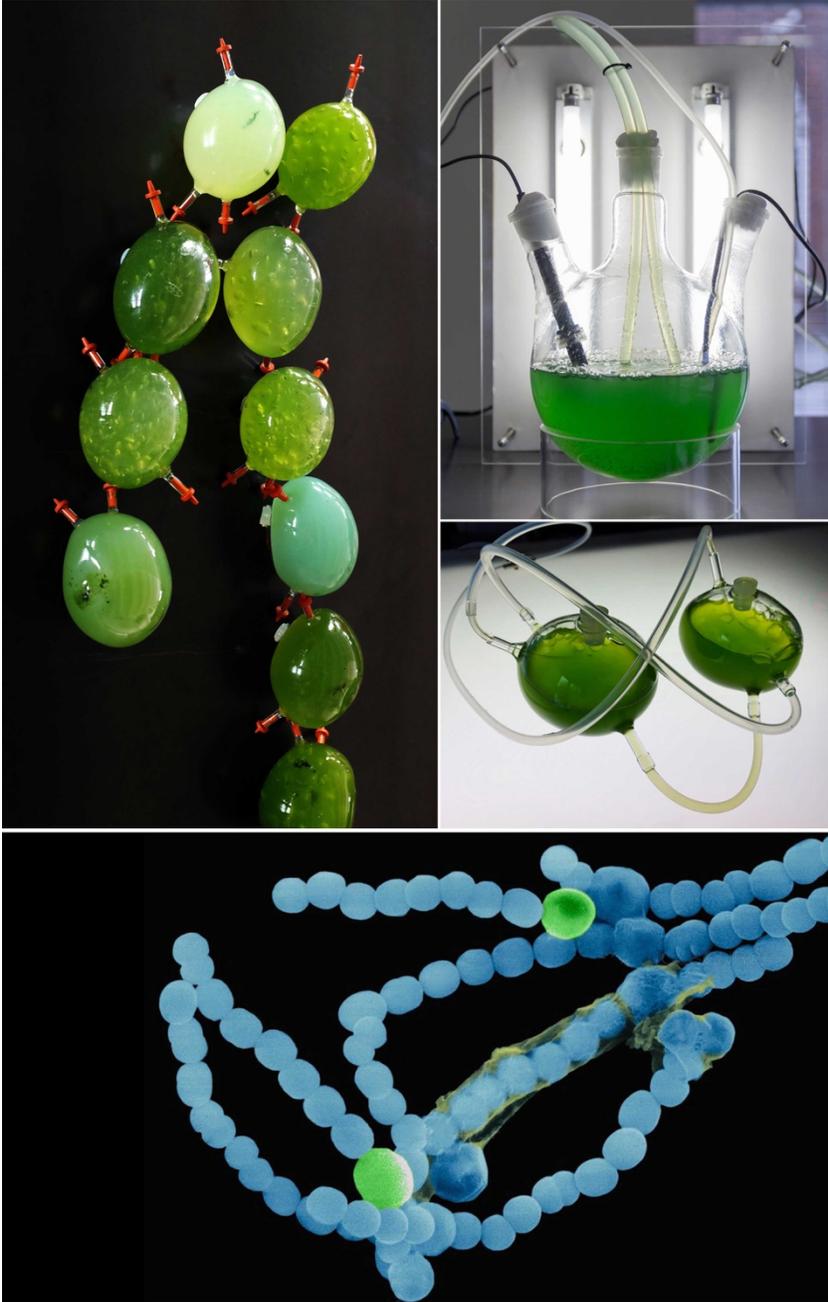


Fig.1: Left: *L'Origine du Monde*, Bacterial Chain
Fig.2: Right: Cultures of Cyanobacteria(*Synechocystis* sp.)

In our Open Greens Observatorium, we will set up some cultures with cyanobacteria. Cyanobacteria obtain their energy through oxygenic photosynthesis. They consume the CO₂ from the air and they release oxygen, similar as plants do. These photosynthetic microorganisms are found in aquatic environments where they form the base of healthy food webs and participate in symbioses with other organisms. The cyanobacteria are the first bacteria of our oxygenic universe, the basis of evolution.

In my installation 'L'Origine du Monde' I work with cyanobacteria. The set up shows a strongly enlarged bacterial chain made from glass cells. Every cell is filled with cyanobacteria producing realtime photosynthesis, and thus cleaning the air. The cyanobacterial colonies are growing little by little and their color becomes more dense green over time. After a few weeks of culture we can harvest the green pigments and use them for e.g. coloring our microbial-grown textiles.

[Links on website:](#)

<https://annemariemaes.net/works/bee-laboratory-works/origine-du-monde-installation/>
<https://annemariemaes.net/works/bee-laboratory-works/electric-veins-object/>

OBSERVING LOCAL SOIL DIVERSITY

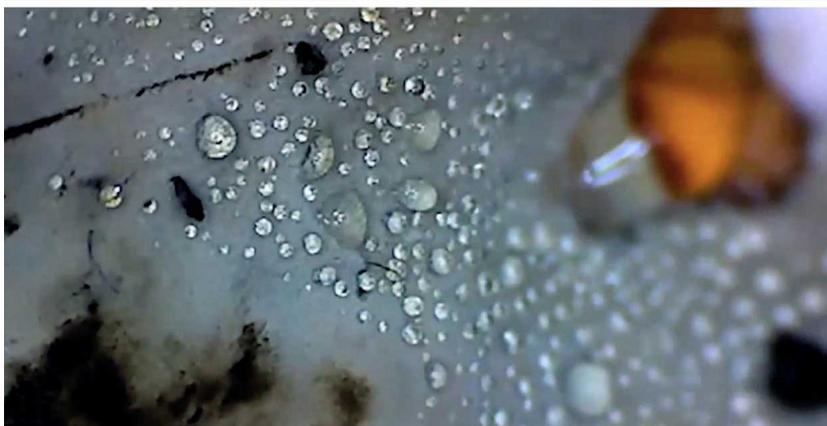


Fig.1: Top: Evolution of a Winogradsky Column, observing local soil biodiversity.

Fig.2: Bottom: Homemade compost with micro-organisms degrading organic matter, seen through a microscope.



The Winogradsky column is a simple device for observing local soil biodiversity. The device is a tubular glass container filled with mud water from the Canal de L'Ourcq, and mixed with a source of calcium carbonate, (egg-shells and shredded newspaper clippings) and a source of calcium sulfate (gypsum or egg yolk). Incubating the column in sunlight for some weeks results in an aerobic / anaerobic gradient as well as a sulfide gradient (image top left). These two gradients promote the growth of different microorganisms, as well as many species of cyanobacteria and algae (image top right).



Next to this experiment, we can set up an experiment for observing the making of compost by micro-organisms. We fill a larger glass container with organic household leftovers collected from Pantin communities. On the glass wall of the container we point a small USB-microscope with incorporated screen, on which we can follow the degradable actions of the micro-organisms (image top right).

MYCELIUM & FUNGI NETWORKS



Fig. 1: Top: flock of Mushrooms, rooftop garden

Middle: detail of mushroom under the cap.

Bottom: Growing edible mushrooms.

‘Where is the literature which gives expression to Nature? He would be a poet who could impress the winds and streams into his service, to speak for him; who nailed words to their primitive senses, as farmers drive down stakes in the spring, which the frost has heaved; who derived his words as often as he used them – transplanted them to his page with earth adhering to their roots; whose words were so true and fresh and natural that they would appear to expand like the buds at the approach of spring, though they lay half smothered between two musty leaves in a library – aye, to bloom and bear fruit there, after their kind, annually, for the faithful reader, in sympathy with surrounding Nature.’

Henry David Thoreau – Writing the Wilderness From ‘Walking’ (1862), in Essays and Other Writings.

In our Observatorium we can grow edible mushrooms in bags or containers, on sterilized kitchen waste (e.g. coffee ground and/or hay) collected by the habitants. Mushrooms are easily grown indoors, where the temperature and light conditions can be managed and where their growing cycle can be observed carefully. The mycelium (the rhizomes, roots) of the fungi can then be used as an alternative eco-material for growing objects such as e.g. old-style beehive-baskets. In combination with digital fab-lab tools (a milling machine to make some cheap moulds in wood) any design can be realized with mushroom-mycelium.

https://research.annemariemaes.net/doku.php?id=mycelium_lab

POLLINATORS



Fig. 1: Bee Agency, the research (2016-2019)

Top – Variation Games (video, 2018): bee behaviour observed with an infrared camera inside the beehive.

Bottom – Caput, Scanning Electron Micrograph of a bees' head (top shot)



Pollinators are vital to creating and maintaining the habitats and ecosystems that many animals -including humans- rely on for food and shelter. It is estimated that more than 1,300 types of plants are grown around the world for food, medicines, spices and even fabric. Of these, about 75% are pollinated by insects.

Since many years I work on an Intelligent Guerilla Beehive. The research project, BEE AGENCY, is a long term project on the edge of art and science. It evokes issues of sustainability and biodiversity, and it gives viewers an artistic experience of my ongoing research related to the disappearance of the honeybee.

The goal of my Intelligent Beehive design is a double one. At one hand it offers a safe refuge for city honeybees, and at the other hand the device itself becomes a biosensor that interacts with the environment, and that measures the pollution of the foraging fields around the beehive.

This project is a collaboration with the non-human other. Honeybees and cyanobacteria (that are cultured to become the biofilm for the biosensor) become interfaces to inform us about the health status of our environment. Bees and bacteria are becoming living monitoring technology.

[Links on website:](#)

<https://annemariemaes.net/projects/the-intelligent-guerilla-beehive/>
<https://annemariemaes.net/works/bee-laboratory-works/variation-games-video/>

GROUND COVERS & HERBS



Fig.1, Top : *Fragaria vesca* shoots and root system;

Bottom – distillation of *Thymus officinalis*

The root-system of the *Fragaria vesca* (the woodland strawberry) is super aesthetic and delicately developed. It looks like lace. This plant is a good sample-plant to study root-growth and to understand how the root system creates an underground rhizomatic network to search actively for nutrients in the soil.

The *Fragaria vesca* is also a good sample plant to study plant reproduction, due to its propagation by runners.

Carole Collet, researcher of innovative textile technologies at Central Saint Martins College of Art and Design in London claims that plants could be genetically engineered to produce both food and textiles at the same time. Through her BioLace project, she biologically reprograms the *Fragaria vesca* to produce both fruits and lace samples from their roots. The new technology would combine food production with textile production, with plants replacing complex, costly and less sustainable textile machinery.

I propose to monitor in our Open Green Observatory a series of lab test tubes with *Fragaria vesca* plants in different stages of growth. We will run experiments with plant roots growing in/round/through delicate 3D printed structures as coral-forms and other very aesthetic nature-inspired designs that are 3D printed. We will also set up a distillation process to make scented water and cough syrup based on home-grown *Thymus officinalis* herbs.

[Links on website:](#)

<https://annemariemaes.net/works/bee-laboratory-works/alchimia-nova-video/>

<https://annemariemaes.net/thymus-vulgaris-monografie/>

<https://research.annemariemaes.net/doku.php?id=wax-perfume>

FERMENTATION

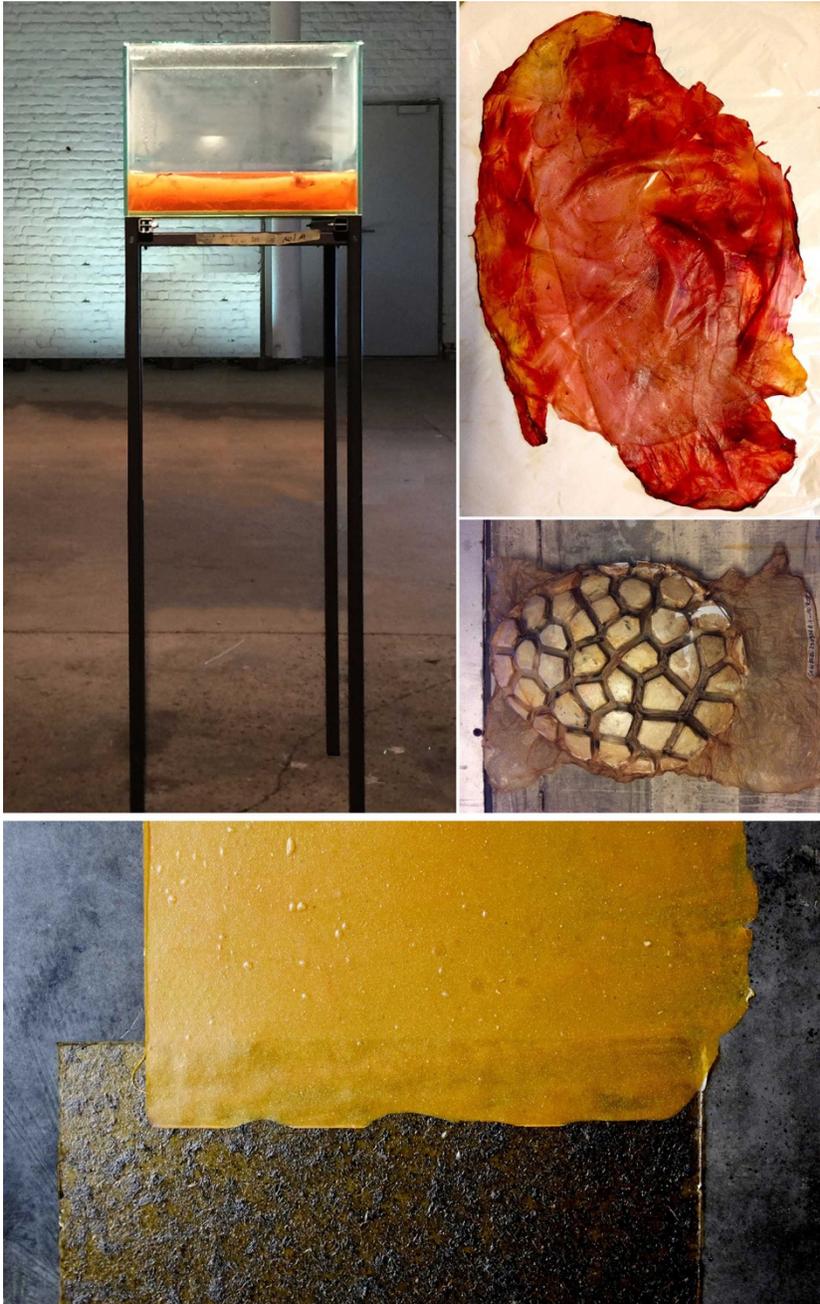


Fig.1: Top Left: New materials from the garden - Growing Cellulose Skins with micro-organisms. Top Right: Coloring organic fabrics with natural & vegetal dyes. Bottom: Bioplastics made with Tangerine peels and with Green algae.

Many products from the garden can be used to set up fermentation processes facilitated by bacteria. The fermentation of green tea and sugar, with an addition of antioxidants (all kinds of berries) to become different color shades, results in organic fabrics grown by *Acetobacter xylinum* bacteria and yeast cells. This versatile cellulose-based material can then be used afterwards to make objects or to produce works of art. The report '*Close reading of the Genesis of a Microbial Skin*' gives a condensed overview of my notes on the fabrication of smart materials, e.g. microbial skin. The project is about growing materials from scratch, by living organisms – as nature does. Biomimesis is used as a starting point for incubating ecological thinking on matter and form. Different sensorial qualities of microbial and vegetal skin are being examined in terms of usefulness for sensing environmental threats. We can also fabricate bioplastics on the basis of fruit pulp and glycerine. These plastics can be deployed as an alternative to oil-based plastics, for creating objects and as packaging material.

[Link on website:](https://annemariemaes.net/projects/genesis-of-a-microbial-skin/)

<https://annemariemaes.net/projects/genesis-of-a-microbial-skin/>

CONNECTED OPEN GREENS

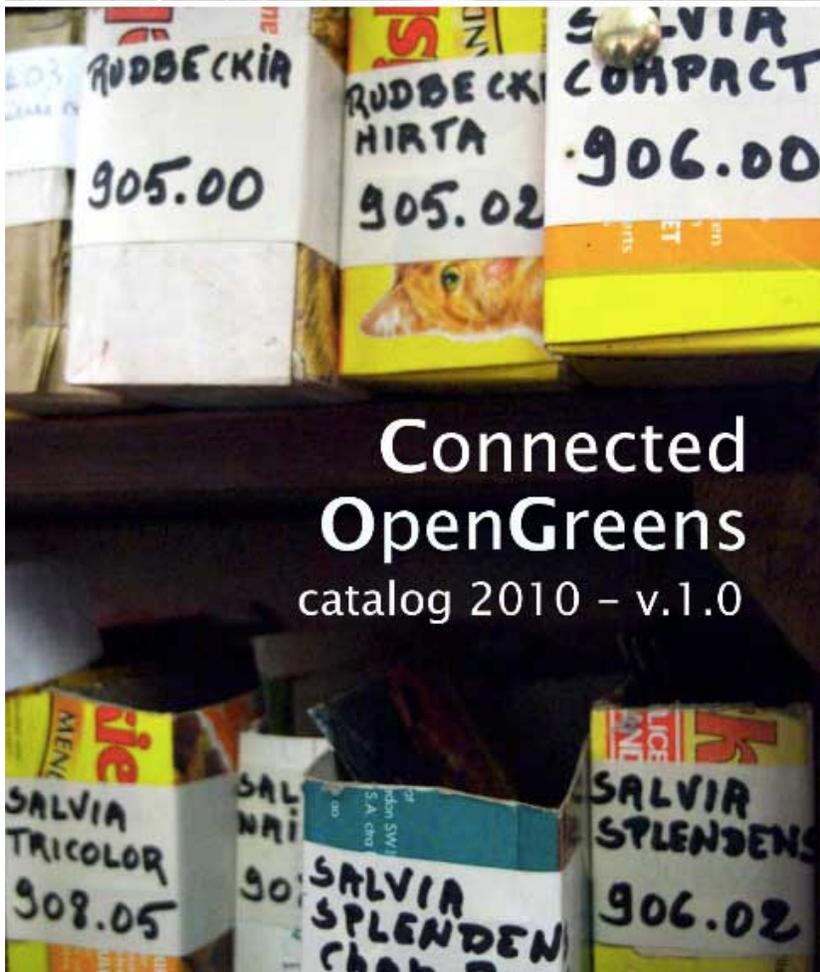


Fig.1: Cover photo of the book *Connected Open Greens* (2011)

This book is the account of my involvement with city gardens, green experiments & collaborations and 'actions for the world'. It was realized for the *Burning Ice festival 2010* (prod. Kaaitheater Brussels) as part of an artistic installation focusing on the exchange economy.

'Connected Open Greens is a publication covering the actions from 2009 to 2010 in the Open Air Lab 'Connected Open Greens'. The Open Green project blends organic and technological matter into one and the same nature. Through analogue and digital means we do long term observations on the growth, blossoming and decay of plants and insects submitted to natural elements such as wind, sun, rain and pollution in an urban context. We monitor and extract data from natural processes both on a micro garden level as on a macro city level and make the data available online. We research the connections between people, technology and the possibilities of rooftop gardens.'

The pdf of the entire book can be consulted online via the link below. (use the full-screen option of the pdf reader).



[Link on website:](https://annemariemaes.net/publications/connected-opengreens-catalog-vs-1-0/)

<https://annemariemaes.net/publications/connected-opengreens-catalog-vs-1-0/>

THE INVISIBLE GARDEN

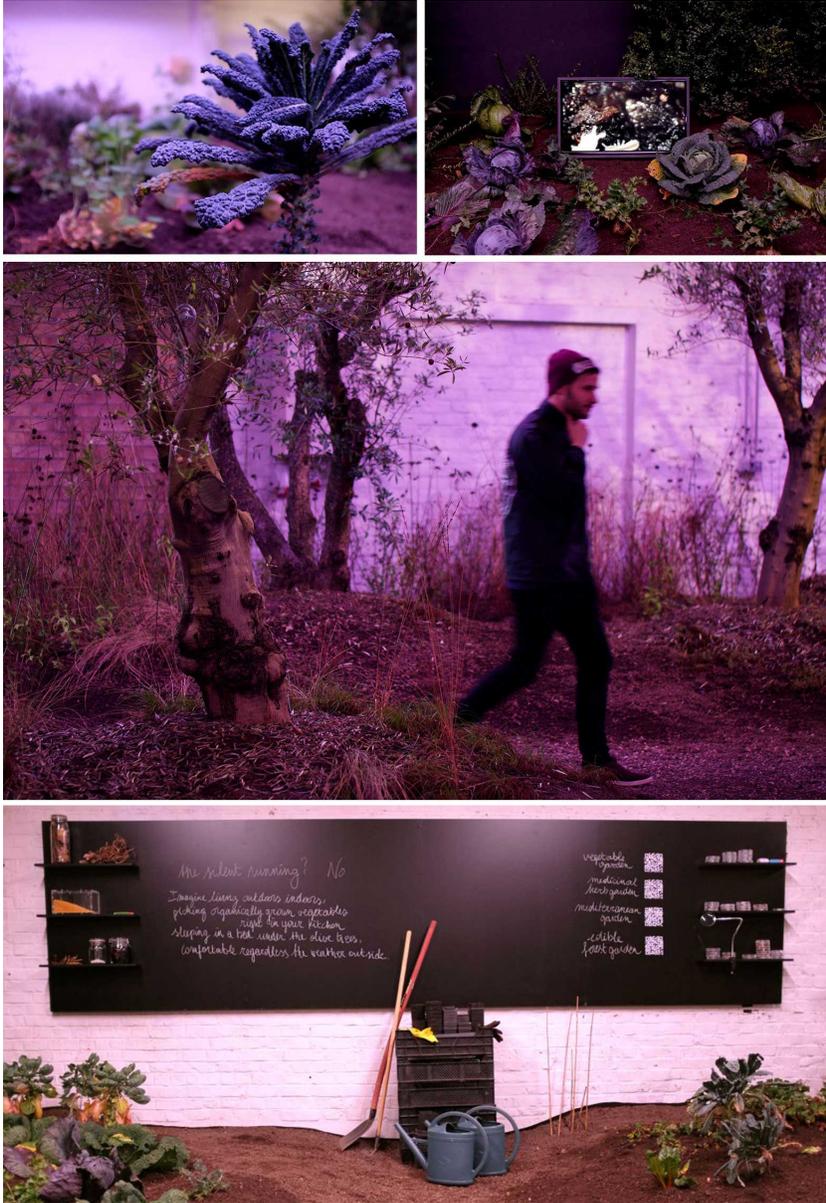


Fig.1: 200m² Indoor Garden in the exhibition 'the Green Light District' (2014)

With 'The Invisible Garden Installation' I created an indoor remake of my Open Air Laboratorium, the garden on the rooftop of my studio in Brussels. 'The Invisible Garden' is a sitespecific project that reverses the relation between nature and art. The transitions between inside and outside, culture and staged nature, become fluid. I ask questions about the current state of our ecosystems and I want to provoke a dialogue about the different elements that make up the physical reality of our urban landscape that is in a constant transformation.

During 3 months, I observed this indoor ecosystem in a naturalist way and my monitorings and fieldnotes are scrutinously documented in several databases. I was particularly interested in how the life style of an organism (be it a plant or an animal born in the indoor garden) was fitting in with the other organisms living around it. I observed in this indoor ecosystem how species deal with their natural enemies. I studied the food web (the network of feeding relationships, of eating and being eaten), between plants and insects. I studied the decomposition of dead leaves by fungi and bacteria. I took many pictures to compare different stages of the evolution, and I studied samples under the microscope. The garden was constructed with the help of inhabitants and they also donated vegetables to be planted in the vegetable corner of the Invisible Garden. Throughout the garden visitors could also discover a series of hidden poetic memories (audio, video). As an artist, I am fascinated

by formal and mathematical structures created by Nature, structures that are often not visible unless you look at it through an artistic eye and with the technological tools of modern science. Within the garden there were hidden examples, shown on small embedded screens, of the extraordinary structures that I was drawing the visitors' attention to. In the Mediterranean Garden, the autumn-palet of the waving grasses were luring the visitor inside a semi-dim room. Once deeper inside the installation, a colder and more exact laboratorium setup was taking the overtone. I tagged every plant with a QR-code. Throughout the exhibition I updated the plant's evolution in my *OpenGreens database* and this information could be tracked by the visitors via their mobile devices.

<https://annemariemaes.net/presentations/bee-laboratory-presentations-2/the-green-light-district-budafabriek-kortrijk-installation/>

<https://annemariemaes.net/ecosystem-of-the-rooftop-garden/>

<https://annemariemaes.net/virtues-of-a-forest-garden-2/>

<https://annemariemaes.net/projects/the-urban-corridors-project/>

BIO ANNEMARIE MAES

I am an artist, herbalist and beekeeper who has been studying the close interactions and co-evolutions within urban ecosystems. My research practice combines art and science, and I have a keen interest in DIY technologies and biotechnology. Since many years I work with a range of biological, digital and traditional media, including live organisms. My artistic research is materialised in techno-organic objects that are inspired by factual/fictional stories; in artefacts that are a combination of organic matter, digital fabrication and craftsmanship; in installations that reflect both the problem and the (possible) solution; and in multispecies collaborations, in polymorphic forms and models created by eco-data and in collaboration with micro-organisms.

Coping with the increasingly visible climate and ecological crises has become an important priority for humanity and it is now on top of the agenda for science and society in many countries. It should also be for art. For the past decade, I have been researching and carrying out art projects to raise ecological awareness and thus induce this behaviour change.

On the rooftop of my studio in Brussels, I have created an open-air lab and an 750m² experimental garden, including a greenhouse, as a place for experiments with models of permaculture and social collaboration. I study living systems, natural networks and dynamic ecosystems and the processes that Nature employs to create form. My research as a naturalist provides an ongoing source of inspiration for my artworks. In my long-term research projects 'the Bee Agency' as well as 'the Laboratory for Form and Matter' I apply notions from the fields of biotechnology and material science in order to combine animate and inanimate materials. My experiments with bacteria, algae and living textiles provide a framework that has inspired a wide range of installations and sculptures with their own behavior, metabolism and agency. My installation projects often consist of a range of materials that act and evolve in mutual response. As if infected by a virus (called 'climate change'), the elements create an uncanny landscape on the border between natural life and science fiction. The sculptures and objects can be seen as an artifacts from the future, as fragments of a world to come. The installations grow, sense, smell and react and they expand over years into a wunderkammer of possible fictions.

My flagship project is a series of sustainable beehives, called 'Intelligent Guerrilla Beehives'. Some of these beehives are presented as speculative designs/objects, but others are fully materialized and put into operation with live bees. These hives are not only creating a supportive environment for bees but they also allow observation through internal infrared cameras, temperature and humidity sensors, movement sensors, etc. They study the embodiment of the bee colonies into the urban landscape. The collected data is turned into meaningful information through signal processing, artificial intelligence, visualisation, and simulation.

My long term projects have been translated in numerous art works. Some of them are installed in public spaces, others have been shown as installations, sculptures, objects and videos exhibited in prestigious venues in many European countries and in art centers worldwide. I am rewarded with various prizes, such as the Ars Electronica honorable mention in the category 'Hybrid Art' in 2017. A short introductory movie on my artistic practices can be consulted [here](#).³

I am currently artist in residency at the Open BioLab Brussels (Erasmus Hogeschool) and at the Hybrid Forms Lab, dep. of Biophysics (Free University Amsterdam), supported by a STARTS grant from the EU.

Please consult my full CV on: <https://annemariemaes.net/about/cv/>

³ AnneMarie Maes, Alchimia Nova (2019) - <https://vimeo.com/313682297>