

The image features a dark, almost black background. In the top right and bottom left corners, there are close-up, high-magnification photographs of green lichen. The lichen has a complex, porous, and somewhat crystalline texture. The central text is arranged in two lines, both in a red, serif font. The first line is in a bold, italicized style, while the second line is in a regular weight with a thin white outline.

***MIGRATION OF LICHEN***  
*MIGRATION OF LICHEN*

*A design fiction that speculates  
about human evolution when the  
earth becomes uninhabitable due  
to climate change.*

*by Naomi Carbin*

# *Preface*

What if I were to tell you, that the current discourse about the climate, of OUR planet, is mainly caused by our own ego's. We keep pointing fingers at others, but we never dare reflect upon our own actions and choices we've made. Humanity has proven to be selfish and only try and solve problems for the benefit of themselves. What if our evolution as human beings, lie in casting aside this 'ego'? The ego that shapes us into who we are as humans, that is perceived as part of our identity, the 'self' and 'I'. What if we no longer hold on to our ego and tried to reconnect with our surroundings, with nature, something we are a part of but lost our connection with. Something that is not only about ourselves. The answer as to how to reconnect is already all around us without us being aware of it. Every living organism is in constant symbiosis with each other and their surroundings. So, what if we went into a conscious and active symbiosis with another organism, that might help us evolve and survive in the coming future. A future where we have harmed the earth in such a way that it cannot be resolved, that the earth will become uninhabitable by humans as we know it now.

With speculative design I want to create a future in which humanity has failed to rethink its position with nature. A future where the climate, the earth, has finally hit back and made it almost uninhabitable for humanity as we know it now. My goal is to tell a story through design fiction. To evoke emotion on our current climate discourse. To raise awareness about lichen and its properties, and what it might mean for us in the future, if our current food system will fail to exist due to climate change. This research & design fiction is not meant to save humanity. But meant as a tool to evolve mankind, to survive the coming harsh environment, caused by climate change. As a means to reconnect instead of disconnecting with our environment.

-Naomi Carbin

# *Table of contents*

Preface	2
Current state of the earth	6
Climate crisis	9
Food systems	12
The future of food	13
Alternative food	16
Lichen in biology	19
Lichen as food	23
Lichen and earth	24
Morphology of lichen	26
Properties	28
Symbiotic enhancement	31
Gaia hypothesis	33
How it works	34
Indigenous stewards	36
Indigenous lichen	38
Surinamese indigenous	39
My indigenous heritage	40
Indigenous culture	42
The ritual	45
Target group	47
Ritual components	49
Lichen products	51
Bibliography	53



# *Current state of the earth*

It's worse than we are assuming. The state of our planet is really giving me worse anxiety problems than usual. How can people not worry about the environment we are a part of. Do you not notice how the summers are getting hotter and the winters colder? Don't you notice how the quality of the air is getting worse and worse every year? I'm honestly anxious about the future of our planet, but also the existence of humanity. We are currently at a discourse, about the current and future state of our planet. What measurements do we take? Is there still something we can do to make a change? What effects will our generation experience? Some people still believe it's a hoax, even when presented with scientific facts about our current state. The planet's average surface temperature has risen about 0.9 degrees Celsius since the late 19th century. (NASA) Numbers don't lie. A big part of this group thinks it's the natural course of our planet, as it has done since its existence, warming up and cooling down. But these rapid changes are by the hand of men itself.

One of the most important things that are currently happening is the many eyes that decide to look the other way while we are destroying our environment. It pains my heart to hear and see how people treat earth. The earth that is giving us so much: breathable air, land to grow our crops and live on, basically everything to sustain life for humanity. It all started from the belief that humans and nature are strongly coupled together, to the point that they should be conceived as one eco system. one cannot exist without the other... However, humanity has entered a new geological era: Anthropocene<sup>1</sup>, where humanity is influencing every aspect of the earth on a scale akin to the great forces of nature. One of the things I started to question was, how long can we keep this up until earth will strike back with these great forces. We are already forcing earth's hand by excessive gasses we push into the air that cause pollution. This pollution is already starting to affect the health of many people but it is still not seen as a problem to many. Outdoor air pollution is currently causing around 3.4 million deaths a year. (Roser) This is one of our largest health problems we are facing due to air pollution.

<sup>1</sup> Anthropocene is a proposed geological epoch dating from the commencement of significant human impact on Earth's geology and ecosystems, including, but not limited to, anthropogenic climate change.

The inspiration that started my research for this project, was strongly influenced by the article: The uninhabitable earth, by David Wallace-wells. (Wallace-Wells) In this article he spoke of many things that can cause the extinction of human kind, but also the things that are already being done. Only recently I decided to purchase the book, to go more in depth about our current climate discourse. To not only be presented with facts, which was confronting, but also to better educate myself on what exactly was going on with earth. By 2050 we will have around 200 million climate refugees according to the UN. (Wallace-Wells, The uninhabitable earth) One other thing that was mentioned was permafrost. Permafrost is frozen soil, that usually would stay permanently frozen. They discovered recently it has started melting. Arctic permafrost contains 1.8 trillion tons of carbon as mentioned in the article and book. This is twice as much as currently in our atmosphere. Just imagine when this gets releases. This was the starting point of my minor project, to imagine a dystopic future where the air would become unbreathable.

## ***Climate crisis***

Our climate crisis has never been as extreme as it is now. There is an acceleration taking place that is being caused by humans alone. Unfortunately, as long as there are politicians like president Donald trump, who is accusing climate scientists of having a 'political agenda' and keeps calling global warming a natural state of the earth and a hoax (Worland, TIME), people will follow and believe these statements. With this in mind I started to wonder what the survival possibilities will be for human kind? is there no way to stop this? will this cause the 6th extinction of earths lifecycle? or will we somehow find a way to ensure our survival?

We need to start rethinking our position and relation with nature. Will humans become extinct due to an environmental breakdown? We know not all living organisms went extinct during the 5th extinction (Nee), how would life be possible after a possible extinction? They somehow managed to survive and adapt to their new environments, they evolved. We as humans, have the power to either design our own ending or come up with a solution

to ensure our survival by evolving, adapting. To ensure our survival by evolving, we could look into human enhancements. These enhancements are inevitable to happen seeing how there is already being worked on human enhancement by not only scientists but also designers. According to Elon Musk we must all become cyborgs (Solon) but won't this cause us to drift further away from earth and our natural environment?

There are enough organisms on earth that could provide us with answers, so why not look into biological enhancement. With our growing knowledge about the universe we could even find the answer out in space. It would be selfish to think that we are the only organisms that can sustain life on a planet. Enough organisms on earth that are already co-existing with one another, to ensure their own survival. For example, lichen and the coral.

Our earth is currently on its knees, but what will it take for us to start making a change. The only way that ensures our survival but also that of earth, is if we stopped thinking

about ourselves only. The selfishness of humankind has caused a lot of pain and destruction in the short time we exist. As long as we don't feel or experience the seriousness & the effects of climate change, people won't step up and take their responsibility. We love to point our fingers at others instead of confronting ourselves with what WE have done. The ego of men is obstructing us from seeing what is at hand. There is a terrifying future waiting for us if we don't make hard changes with not only our environment but also within ourselves. As I see it, we can only survive if we find a way to reconnect with nature. Take only what is needed & respect what we have.

# ***Food systems***

One of the main problems we are currently facing, due to the state the planet, is that we must rethink our current food system. Through the eras of mankind, our food systems have changed. So why not adjust our current food system to the problems we are facing today and in the near future? Our current food system is broken in a way that it is currently causing 1/3 of all greenhouse gasses (Garnett) because of the usage of transport, heating, lighting and air conditioning combined. Due to global warming its also causing damage upon the food production, because of the extreme weathers such as drought and over flooding. As the UN has announced earlier this year (Flavelle), we will face a coming food shortage caused by overpopulation, over consumption and because of these extreme climate changes. It's putting a dire pressure on the ability of humanity to feed itself.

## ***The future of food***

The production and the consumption of food needs to be rethought, if we want to keep feeding everyone. Marije Vogelzang, teacher and head of department food non-food at Design academy said: “if we keep consuming the way we do, we won’t have the foods that we have now, so we need creative ideas to change this food system. (Dutch Profiles)

Marije Vogelzang believes designers can help us change people’s perception of food, because that’s one of the things we are currently having problems with. Chloe Rutzerveld, also a Dutch food designer, wrote a book: food futures (Rutzerveld), about how we need to rethink our current food system and our perception on this for future purpose. Chloe Rutzerveld, a food designer, wants to reshape our current food system through food technology and multi-sensory experiences. During one of her exhibitions at NEMO called: future foods, she took visitors on a trip where you start at our current position that moves towards the future. Discovering the different potentials of different food sources and how ingredients we know now might change in the future,

because we might be producing them in new ways. You can think of cultured and laboratory grown meat or insect-based diets. Space10, research and design lab, who are supported by IKEA, even published a cooking book where they tried to implement these 'future ingredients' into dishes we are already familiar with (Space10). For example, the meatball, but then with insects, or algae. But since it still holds the same appearance, people are less taken aback. Goal of the future food exhibition was also to communicate what people are working on now, inventions, ideas and visions for the future in a visual journey but also understandable for the common audience. In a way Space10 did (who were not exhibited in the future foods exhibition, but had the same approach). The exhibition Chloe Rutzerveld curated and the book she wrote about the future of foods is mostly inspiring, because she involves consumers into the discussion about the potential of the future of foods. Most visitors' replies were that they came to understand new production techniques they were unaware of for future purpose.

It was mostly eye opening to most people because most ingredients in our own kitchens are already more accessible than we might think. This is also one of my goals with my graduation work, there are many other food options already all around us, without us noticing. If you don't make people aware of it or point it out to them, they will never realise this, while most people are very welcoming to new and innovative ideas when it comes down to changing the way we currently eat.

In a way you could say Chloe Rutzerveld's work has inspired me early on during my studies, since I've always had an interest in the food industry since my study in packaging design in 2015. Back then I already wanted to change people's way of thinking and perception of our current food industry, but also the way we approach subjects like these, to create an awareness about subjects we are taking for granted in our society. Like food, we just assume it is there and we barely think where it comes from, how it is produced... we just consume it. A result, food waste & over consumption, and this while we need food more than ever with the increasing population world wide.

# *Alternative food*

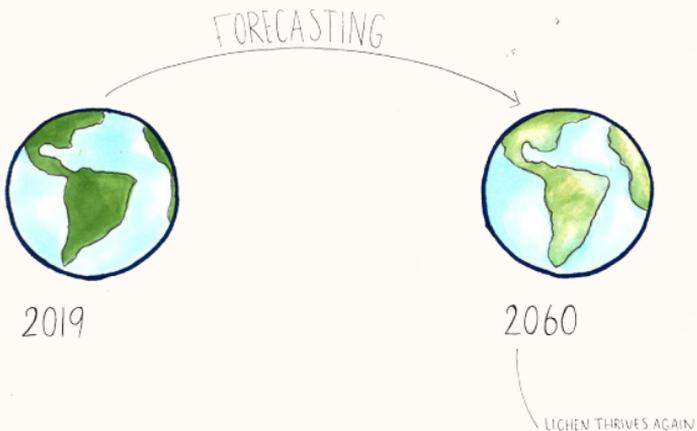
At the start of my project I was set on doing research that was about alternative food sources. I started to look into what other food sources might become useful for us in the future, if our current agriculture will fail to exist due to climate change. We already know insects might become a main source of protein, as Chloe Rutzerveld also mentions in her book, *Future Foods*, but also during her exhibition *Future Foods*. We also know algae is a good future food source, as it is already a way for a lot of vegetarians and vegans to get their omega-3 fatty acids into their diets, it could become more prominent in the future for everyone in their diets. These 2 future food sources are super trending, as a lot of designers and scientists are currently working on this. During my minor I challenged myself to find a new food source we could also use in dire & famine times.

During my search, I stumbled upon Julia Schwarz and her project: 'Unseen edible' (Julia Schwarz). Within this project she also sought out alternatives for when food stops growing, populations increase, and the climate will get

more extreme. She investigated food sources people used in famine times for survival in history and there was one thing that kept popping up: Lichen. With her project she wanted to create awareness about lichen, since its growing all around us but people are unaware of this. Not because they don't want to eat it but because they do not know it's a possible food source for us (or for in the future). A lot of people confuse lichen with moss, while it's something entirely different. As to where moss is a plant, lichen is a micro-organism. Lichen is a symbiotic organism that exists out of a fungal and algae partner (sometimes a cyanobacteria). The two or more partners have quite a complex relationship. The lichen symbiosis is often described as mutualism, but it could also be described as 'controlled parasitism' as the fungal partner is the dominant one, and the photobiont<sup>2</sup> might be inhibited in their growth. Julia Schwarz created a short film in which she shows a glimpse in the harvesting and the usage of lichen in the Nordic countries, where it is still used in some of their food, like bread (used to boost the immune system), and the nutritional values of lichen and how it can

<sup>2</sup> Photobiont A photosynthetic symbiont, especially those in symbiosis with fungi in lichen

become a future food source. She also created a small range of food products where lichen was implemented in the ingredients. She also helped design harvesting tool and a way they could be used and the environment to multiply them, to give them more space to spread out.



Currently lichen covers around 8% of earth's surface. I made a forecasting in which lichen will thrive in 2060 because of our current climate discourse, where urban city will cease to exist as we know it now.

# *Lichen in biology*

Lichens are symbiotic organisms consisting of a mycobiont (the fungal partner) and one or more photobionts (a photosynthetic partner which can either be green algae or cyanobacteria<sup>3</sup>). The two or more partners have quite a complex relationship. The lichen symbiosis is often described as mutualism, but it could also be described as 'controlled parasitism' as the fungal partner is the dominant one, and the photobiont might be inhibited in their growth. (Nash)

Lichen is a difficult organisms to research. Most experiments have dealt with natural intact lichen. It would be better to experiment under laboratory settings, but lichens cannot be taken from nature and then just simply be grown in a laboratory for a longer period of time. This makes lichen-research hard. The alternative is to culture lichen into artificial tissue and experiment under 'cleaner/single-species' conditions. Only since 2019 the research on lichen was continued, after they discovered there was a 3rd partner present in the symbiotic relationship, a 2nd fungus. (Grens)

<sup>3</sup> Cyanobacteria are a group of photosynthetic bacteria, some of which are nitrogen-fixing, that live in a wide variety of moist soils and water either freely or in a symbiotic relationship with plants or lichen forming fungi

### How to identify the substances in lichen?

There is entire book on how to identify the certain substances in lichen. It describes methods for the isolation and identification of lichen substances. The book contains references to all the 700 known substances in lichen described up until 1995. The biological role of certain lichen substances (the secondary metabolites<sup>4</sup> probably) might have important biological roles. Two roles that I would like to describe are anti-microbial and anti-predation. (Siegfried Huneck)

- **Anti-microbial:** The fact that lichens grow slowly and yet are resistant to decay-microorganisms suggests that lichen substances might work anti-microbial. Furthermore, these substances are known to be clinically effective antibiotics, and also have a protective role in nature. However, there is little direct evidence from field studies.

- **Antiherbivore:** Despite their availability as food to generalist herbivores, lichens are seldom eaten, suggesting that certain lichen substances discourage feeding. Recent research, done primarily with invertebrate con

<sup>4</sup> A metabolite is an intermediate or end product of metabolism. The term metabolite is usually used for small molecules.

sumers, indicates that some lichen compounds are capable of defending lichen tissue from predation. What I determined from these two roles is that, lichens are eaten by herbivores, but certain compound can make them un-edible. AND, you could think about using lichen as antibiotics/medicine next to it being a possible food source

A wealth of natural products from lichen's secondary metabolites. In recent years it has become apparent that lichen produce unique secondary metabolites . These metabolites might have antibiotic traits, as mentioned earlier. Research has mostly focused on substances produced by the fungal partner in lichen. But many photobionts and lichen-associated bacteria seem to also produce a range of potentially valuable molecules. This is most evident in studies of cyanobacterial photobionts, which produce compounds that differ from free living cyanobacteria. Future techniques offer a promising way of tapping into a wealth of natural products derived from these compounds. Secondary metabolites are organic compounds produced by bacteria, fungi,

or plants which are not directly involved in the normal growth, development, or reproduction of the organism. An example is antibiotic.

In research they also tested lichen its responses to aridity . The researchers were able to determine the traits that made lichen better prepared for a dry spell. Apparently, the species of photobiont partner was one of the most important traits. The role of diversity in lichens (it is important that there are many different species as they all have different traits). The researchers also state that lichen could be used as indicators of climate change. Most lichens grow in an environment where the air is fairly clean. In the middle of the city centre you will encounter less lichen than when you move to the outskirts. This is also where I found most lichens for my research, local parks within Rotterdam that were outside of the city centre.

## ***Lichen as food***

Lichens are a primary food source in winter for reindeers (edible for herbivores). Lichens are part of a food web in which lichens are eaten by caribous and caribous by wolfs. Certain toxic wastes are found in lichen (when the environment is polluted) and these wastes can be traced all the way back to the bones of wolfs. (Gaare) Seven species of lichen were eaten by soldiers in the war of Bosnia and Herzegovina. (Redzic) The most used lichens were *Evernia prunastri* (oak lichen) and *Usnea* sp. (Old Man's Beard), used for porridge and for lichen flour. One of the products produced by lichen might also work as an antioxidant. The aim of this study was to evaluate the antioxidant properties of an edible lichen *Ramalina conduplicans*. The results suggested that this edible lichen species have the potential to be utilized as food additives or as protective drugs.

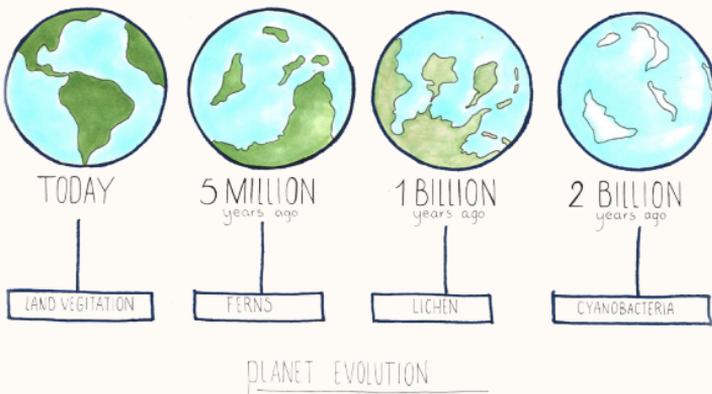
Edible Lichen for humans can be found in New Zealand. (Galloway) A detailed guide to the more than 160 New Zealand native plants that have provided some form of food from pre-European times to the present. Including lichen. Each species is described in detail, identifying its size, colour, shape, edible parts, nutritional value, location and food use.

## ***Lichen and earth***

Lichens play a very important role in ecosystems. In an article reviews called: Biological Reviews, Asplund, J., & Wardle, D. A. wrote about the different traits affect and the role of lichen in our ecosystems. Lichens occur in most terrestrial ecosystems; they are often present as minor contributors, but in some forests, dry lands and tundra's they can make up most of the ground layer biomass. As such, lichens dominate approximately 8% of the Earth's land surface. Despite their potential importance in driving ecosystem biogeochemistry, the influence of lichens on community processes and ecosystem functioning have attracted relatively little attention.

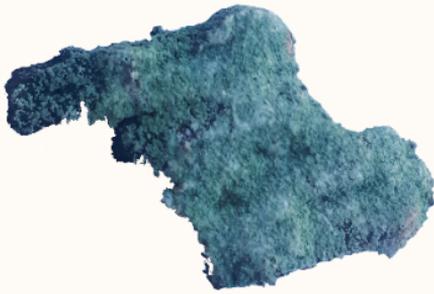
The diversity of Indian lichen flora has undergone a considerable decline in the last five decades. Among the various anthropogenic activities, overexploitation and selective removal of economically important lichens have become major threats to the lichen flora of the country. Commercial samples of lichens collected from different states of India were studied for their source and commercial use. Among samples offered for sale,

**38 different lichen species were identified. The western Himalayas proved to be the main area for lichen collection, while some lichen species also come from the central and Western Ghats. Local traders coordinate the lichen collection and then sell the material to traders in the foothills, and from there it is processed and distributed to other parts of the country and abroad. (Devkota)**



**Lichen has been a part of earths ecosystem for over 2 billion year, and still does today .**

## ***Morphology of lichen***



**Crustose lichen**



**Foliose lichen**



**Fruticose lichen**

Within the lichen morphology, they can be separated into 3 different kinds. The crustose lichen, which can be recognized by its crust like texture. They form a crust like texture on the attached surface, like rocks, soil or even a car. Foliose lichen has a leaf like texture. They are often flat and the leaf like texture can resemble lettuce. These are mostly found on barks of trees. The final one in the lichen morphology is the fruticose lichen. The texture of the fruticose can be pendant and hair-like, upright and shrubby. These can be found on trees and different substrates.

## ***Properties lichen***

To sum it up again, lichen has many properties that can be beneficial for humans. The few things we do know about lichen is that it can be used as a famine food source, as it did in the War of Bosnia and Herzegovina, it can withstand harsh environments (think about climate change), can be an indicator about the air quality of an environment, can withstand radiation and it can be used for its medicinal properties. To visualise the properties of lichen I made different mood boards to communicate what it could do for us.

The images from 1 to 4 are each a mood board/visualisation of the properties lichen can provide us with. I tried to create an easy to understand visualisation of these properties by making collages and using images of humans to communicate this could be beneficial for humanity in the future.



Withstand harsh climate environments.



Provide us with food in famine.



Withstand radiation and an indicator about the air quality.



Medical properties of lichen. (antibiotic).

# *Symbiotic enhancement*

Julia Schwarz really inspired my current project and made me think, there was so much more potential to lichen than she has/could show. Her project is amazing, don't get me wrong, but to make people aware of this symbiotic organism, that is already all around is, as a possible future food source... I just knew there was more potential to lichen itself. One of the most interesting aspects, to me, was that lichen was a symbiotic organism. Over the years I've watched so many sci-fi movies and there was only 1 I could clearly remember that was about symbionts: *Venom*, from *Spiderman*. In other sci-fi movies they would mostly show different kinds of human enhancements, mostly in the technical area. Think about cyborgs for example, that I started to wonder what could happen to humanity if we were to evolve on a biological level instead of technological. In a talk between Alibaba chairman Jack Ma & Elon Musk (*Rapier*), Jack Ma actually doubled his warning that technology and AI could one day pose a serious risk and danger to human society as we know it, in which Elon Musk argued that we think it's dangerous because we think it's a sort of

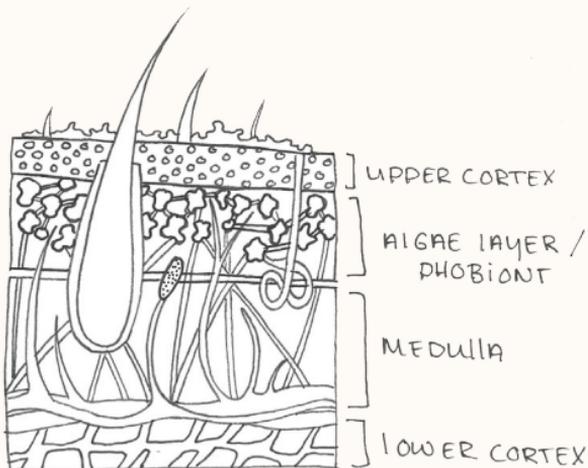
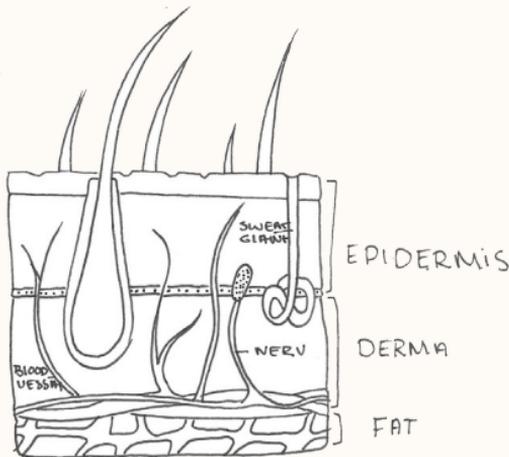
smart human being, but that it is going to be so much more he said, 'It'll be much smarter than the smartest human'. In which he added: 'if you can't beat them, join them. According to Elon Musk we must evolve ourselves into cyborgs. According to Donna Harraway, as she wrote in her manifest: I am cyborg, We are already cyborgs. For example, our phones and the computers we are daily connected to. However, I strongly disagree with the remarks of that we are already cyborgs. Yes, you could say we are cyborgs since we are in continuous contact with technology, so much, it has become an extension of ourselves. This does not mean we became a whole other being. We are first, human beings, humans who are part of the ecosystem on earth, just as all other living organisms. I do understand why most people would find it thrilling to enhance themselves to a higher level of 'being' but this is also exactly why we are facing this climate crisis. We have lost the connection to earth due to all the developments and inventions we have made to make life more comfortable for ourselves.

## *Gaia hypothesis*

James Lovelock, a scientist, environmentalist and futurist, is best known as the person who proposed the Gaia-hypothesis (Lovelock). In this proposal he wrote that the earth functions as a self-regulating system. Within this system, all living organisms interact with their inorganic surroundings on earth to form this self-regulating system, all to maintain the conditions of life on the planet. So why is it... that we humans are the only living organisms that go against this? We are currently on a self-destructive course to destroy our only habitable planet, for as far we know. In a way you could say that all living organisms on earth are in an unconscious symbiosis with the planet earth. Without its organisms, earth will also stop functioning. All organisms have their function within this eco system, for example algae. Algae produce most of our oxygen that we breath in and out every day and it's a main food source for most marine life. (Chapman) The same goes for the functioning of our bodies, most bacteria that are present, we are unaware of. We know they are there, but we don't notice them, yet they still help our bodies function. What do we do when our bodies get sick? We try to help it recover right? So why not do the same for earth.

## *How it works*

Illustrations on how the lichen symbiosis works. first illustration normal human skin, second one with lichen in the skin. Lichen makes usage of photosynthesis and needs sunlight to produce it's nutrients, just as the human body/skin needs sunlight for vitamin D. I drew it in such a way that the lichen is integrated into the skin in a way they both still need sunlight in order to function properly. Once the lichen absorbs the sunlight, it will produce the needed nutrients that will be given off into the bloodstream. .





**Illustration of how a lichen-human symbiosis can look like on the human body.**

# ***Indigenous stewards***

To reconnect with nature, I've been looking into different indigenous tribes. Indigenous people are also known as the first people, first nations & native people. They were known as the original and earliest known inhabitants of an area, in contrast to groups that have settled, occupied or colonized an area. (Wikipedia) Indigenous tribes always had a close & deep connection with nature. Two are equal & interdependent, even kin. This idea is clearly reflected in the Maori word 'kaitiakitanga' which means guarding & protecting the environment in order to respect the ancestors & secure nature. Their close relationship to the natural world and its lands is shared by many other indigenous tribes all over the world, and highlights why these often marginalized ethnic group is gaining recognition as vital stewards for our environment.

Next to being vital stewards for our environment, indigenous culture is also part of my own heritage. My experiences with my own heritage were that I was taught to only take things that were needed. Whenever I picked a flower my mom would tell me: Did you ask if

you could pick it and did you say thanks? This small gesture really stuck with me, without really knowing its origins. This sparked the curiosity to also learn more about my own cultural heritage, seeing how they had a strong connection with their environment. Within my family it is my grandfather who is from indigenous descent. However, he did not want to teach his children about their indigenous heritage, because it's a dying culture. He only told about small things but never things that really told you about their beliefs and way of living, not even the language they spoke. Hearing these arguments, it made me even more curious to learn more about indigenous tribes and use this as inspiration for the continuation of my project. We could get a lot of inspiration out of their way of living and adapt or reframe it for something in the future. It's about rethinking our position and relation with nature by looking back at our past, and learn from it, what of it could we adapt in our present way of living.

## ***Indigenous and lichen***

There is also a strong connection between indigenous tribes and lichen. Through out history they have used lichen to poison arrowheads, by soaking them in lichen. They also made use of its medicinal properties by using it anti bacterial to treat wounds but also to cure inflammation. Indigenous communities in the Nepal Himalayan still make use of lichen as it still plays a vital role in their economy and its cultural role. They still make use of it by using it as an ingredient to their good but also for medicines. Lichen were also used in shamistic rituals were it was used for its hallucinogen properties (special lichen species). (Mcallister)

# ***Surinamese indigenous***

My cultural background is originated in Surinam, which is located in the north of South America. Surinam used to be a colony owned by the Dutch government from 1667 until 1954, when it became a constituent country of the Kingdom of the Netherlands. (Wikipedia) This colonial time is marked by slavery, most plantations located in Surinam relied on slave labour. Most of these slaves were brought to Surinam by the Dutch west Indian company from the west of Africa. But before Surinam got colonized its inhabitants were indigenous people. To this day this ethnic group still has no rights within Surinam. Not only in Surinam but all over the world, while indigenous people were the original inhabitants of these lands. In 2007 Surinam voted for a UN declaration (IWGIA) on the rights of indigenous, but because Surinam is based on colonial legislation, it does not recognize indigenous or tribal people. Because of the legislation there is a major struggle over lands and other rights that form a threat for indigenous lives. It forms a threat of the survival but also well-being of these people, along with respect to their rights, particularly given the strong focus on the many natural resources Surinam has.

## ***My indigenous heritage***

Because of my own indigenous heritage and the colonial influences it still has today, I decided to learn more about this and use this indigenous influence for the ritual on lichen symbiosis. As I mentioned earlier, there was not much my grandfather learned us about our indigenous heritage since it was a dying culture. This is exactly why I want to reach out to this part of my history but also something that is a big part of my identity and who I am as a designer. A social designer who engages in social topics that relate to my own position within our society.

I decided to reach out to my uncle, from my grandfather's side, his brother. My mother pointed out to me that he also researched his heritage years ago, and that he could tell me more if I wanted to know anything. After getting in contact with my uncle, I did not only learned about what tribe my family originates from, but also its colonial past and from which plantation we were. The tribe my family is from is called the Karaïben. Most indigenous tribes in Surinam were seen as the lowest class citizens, because they did not attend any

universities or had a proper education. Instead of attending these, they learned from their ancestors. How to manage the land in a sustainable way. They knew about the land, the flora and fauna and they were the best guardians of nature. They deepened on the natural world and their environment to meet their daily needs. they only took what they needed. This is also one of the basic principles I got taught when I was still a child. I enjoyed learning this because certain things I learned when growing up made sense now. I knew where they originated from and it wasn't just something my mom used to tell me. Not that I doubted her in any way, but it showed to me that she also kept the small things she learned about her heritage. The Karaïben, and other indigenous tribes in Surinam, lived in harmony with the land. "We know we are part of nature and if we abuse the land, we as humans will pay a high price".

## ***Indigenous culture***

Indigenous tribes in Surinam are also referred to as Amerindians. This meant they were related to the indigenous tribes that lived in America. Amerindians follow the Amazonian cultur\*. One in which the human & the spirit world is intricately connected. Transformation of form, from spirit to human or animal abound. the meditation between these world was often guided by a shaman. This made me believe even stronger in my concept of combining the human mind with lichen and transform it into something new. Not to save humanity but to give them 'a tool' to ensure their survival. To help them transform themselves. (Arnaiz-Villena)

After learning what my indgeneous tribe was and that they lived by amazonian culture. I wanted to learn how their relation was to nature and what rituals they used that were connected to their environment. Most amazonian tribes developed a hunter/gatherer culture and moved from areas every few years. This culture dates back to the very beginning of human development but is still practiced to this day. Because there are so many different

indigenous tribes throughout the Amazone its difficult to pinpoint what their exact traditions are, but one thing that keeps coming back is how extraordinarily artistic these people are and that color played a big part in their rituals/traditions.

Within the Karaiben culture I could find a few more detailed traditions that took place, like the coming of age ritual. With this ritual they were asked, without showing any signs of pain, to hold their hands in a bowl of ants. This is seen as the transition to adulthood. Something else that stands very central in Karaiben culture is the position of the shaman (psyjai). This is very interesting, seeing how most Karaiben people are baptised in roman catholic beliefs. The role of the shaman is comparable to a priest his role within a church. They provide their people with knowledge (often through 'turara', incatations) during various times, such as during initiation or when someone died. (Anda Suriname)

Learning about my heritage in relation to the ritual I want to design for my lichen symbiosis, I noticed how I was mostly interested in their artistic usage of colours and incitation by shamans. Their beliefs in relation to how they know they are a part of nature and do not wish to harm the earth and live in harmony with it. How harmony through meditation could be achieved. All these beliefs are values I wish to implement within the ritual I'm designing. The people who can partake in my lichen-symbiosis ritual will be for a community of people who are willing to reconnect with nature. A community who is aware of the strong connection between human and nature but also the spirit. Those who respect their environment, to be a part of it but not rule it, to help protect it. Who share these same values.

# *The ritual*

One thing that started to fascinate me during my research was the human mind. This became stronger after reading 'how gaan we dit uitleggen' by Jelmer Mommers. I concluded that most of the problems we are facing today in our current society is caused by the human ego. You could almost say: what is a human being without their ego? A portion of the human personality, which is experienced as the 'self' and 'I' are continuously in contact with the external world through perception. What we experience and see is what defines us as 'us' in the end. The ego is responsive, therefore always adapting & changing through the events of life. What I started to question was, if we did not have our egos, in what kind of state would the world be? We have always felt superior in many ways, we can take what we want because we believe it's ours by power or the feeling of possession. We reshaped the lands to live and produce food from, we make it in a way so it's comfortable for us to live in. However, this also caused us to disconnect from our environment, where we are a crucial part of.

One of my drives during my project was also to evolve our minds through symbiosis, with lichen. Now, towards the end of my project I realised this is still a crucial part of the symbiosis. I wanted to create a tool for humanity, to ensure their survival, not to save or prevent a dystopian future. To not only think about themselves but also the environment and everything around them. To truly connect.

## ***Target group***

This ritual will mostly be inspired by indigenous tribes, which is also part of my personal background. A few things that really interested me when conducting research into their rituals and traditions, was the usage of a shaman. A shaman that used incantations to bring people in a certain trance and higher consciousness, he would guide them. As my project progresses I realized that it was slowly shifting towards spirituality, in terms of research but also personal interest as i was learning more and more about indigenous values & beliefs. That's why I want to focus on reaching out to those who are share these values and believes but also those who have an interest in some sort of spiritual enlightenment. Those who believe in something more, a deeper consciousness within earth.

My project focusses on reconnecting with nature by going into a symbiosis with an other organism, to also cast out the selfish ego of men. But for who is my ritual? My ritual targets people with values that align with those of indigenous tribes. To protect the environment and to not harm or rule it, but to live peacefully

together with it. To only take what we need to survive. The audience can also be people who attend festivals where they aim to inspire and nurture human development, with the intention to enable a state of ultimate unity. (example could be BOOM festival, which is held every 2 years in Portugal.) This ritual is also for those who are searching for a form of healing as in the ayahuasca rituals, a spiritual practice to align with themselves. A connection that goes beyond ourselves. The goal is to create a tribe of people who wish to reconnect with nature, to not rule it but to be a part of it.

## ***Ritual components***

For me it's important the ritual consists out of clear components, that use the lichen in different kinds of ways.

- At the start of the ritual, the shaman will start burning the lichen candles (beeswax infused with lichen), to help its tribe focus but also to purify the air and to improve the health of their mind, body and spirit.

- The shaman will then make use of lichen dye to start it's tribes transformation. Facepaint will help take on the powers/properties of the lichen.

- The shaman will start its guidance with making the tribe feeling grounded and connected with themselves, and how they are part of something more than only themselves. To guide their minds and to focus on what is happening around them, to feel grounded. What do you feel, smell or hear when you are just out in nature. (lichen candle still burning)

Once everyone reaches a higher consciousness at the end of this meditation, its time for the last step.

- The last part consists out of sharing lichen bread with the tribe. This will help them to reach a deeper connection with the rest of the tribe but also within themselves. They have a new consciousness that's entering their minds, the lichen migration. The disconnection is starting to fade away as they slowly reach the lichen-human symbiosis and feel more connected to their surroundings and themselves. They reached lichen enlightenment!

## ***Lichen products***

Since making essence oil would require me to be in the possession of certain tools and knowledge (distillation), I decided to look into other ways of creating smell with lichen. Aromatherapy is a holistic healing treatment that made uses of different plant/herb extracts to help with your health and well-being. With the smell of aromatherapy they tried to improve the health of the body, mind and spirit. It helps with your physical and emotional health. Beeswax candles are often used with aromatherapy and is known for its healthy properties as well-being, anti bacterial and releasing negative ions. It purifies and cleanses the air.

Initially I also wanted to make dye out of lichen, to use as face paint during the ritual. This originates back to indigenous culture\*, where it not only meant an artistic expression, but also to transform oneself. Before we sought to vent our artistic impulse on a cave wall, we painted on our faces and bodies. Indigenous people from the Amazon have said it is also to demonstrate our humanity and set ourselves apart from the world of animals. Indigenous tribes would often use facepaint as a means to

take on the powers of animals or the gods they worshipped. As making lichen dye could take up months before you saw any results of pigment, I saved up the water in which i boiled to lichen, to see if i can still make paint out of it. In the end i mixed acrylic paint and added the lichen water to thin out the paint. This way it was still implemented into the paint.

As for the bread, in various religions breaking bread meant to share a meaningful connection over a meal. It brings people together who once disconnected. Lichen bread is something that already exists in Scandinavia, where they use it to boost ones immune system. By combining a religious belief about bread sharing and the lichen in combination with each other, I saw this as a fitting end for the ritual. To truly connect with one another. To digest the lichen.

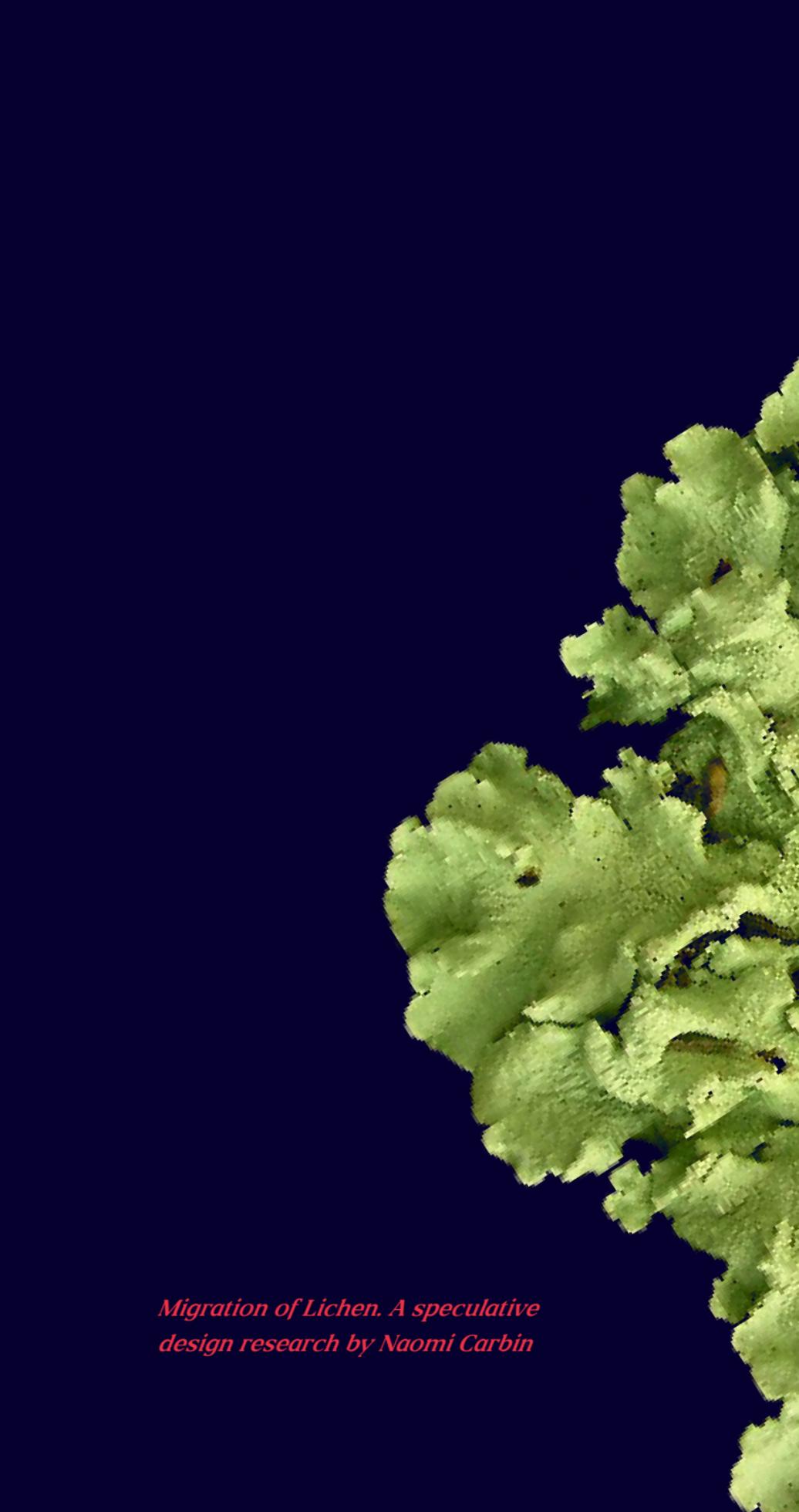
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A close-up photograph of a bright green, textured lichen against a black background. The lichen is composed of numerous small, overlapping, leaf-like or scale-like structures, creating a complex, porous appearance. The lighting highlights the intricate details and vibrant color of the organism.

*Migration of Lichen. A speculative  
design research by Naomi Carbin*