Understanding macroalgae and seaweed

Macroalgae can be up to four-hundred times more efficient than trees at removing CO^2 from the atmosphere. Algae is a term used to describe any marine plant that can photosynthesis. Algae and seaweed can often refer to the same thing, however seaweed usually only refers to macroalgae visible to the eye. Algae is a term that includes both macro and micro algae.

Gelidium sesquipedale is a red algae used to make high-quality agar which the artist uses to make bioplastic. Photo taken by the artist on the shore of Sidi Bourzid, Morocco.

- Harvested, algae can be used as a food, biofuel, additive in beauty products, wound care, material and pigment.
- It is an economically significant plant for economies that harvest and process it, and supports wide groups of independent harvesters.
- As global fish stocks decline, fishers in some regions have turned to seaweed farming to stabilise their incomes

  Following the downturn in tourism following the 2020 pandemic, locals in Bali began farming seaweed.
- The global seaweed market was worth US$4 billion in 2017, and could be worth US$9 bilion by 2024.[1]
- Some types of seaweed can be farmed.
- Farming seaweed as part of ocean permaculture systems can be a restorative practice that supports ocean ecosystems. It can improve water quality, reducing acidification and supporting biodiversity — helping to combat some of the biggest human-made challenges facing our oceans, including coastal pollution, habitat degradation, overfishing and the impacts of climate change.

1. [Source: World Economic Forum, Seaweed Market by Product and application: Global Opportunity Analysis and Industry Forecast, 2018-2024]

Microalgae and cyanobacteria

Breath in. Over half of the oxygen you just inhaled was made by cyanobacteria. They produce 50-80% of the oxygen on earth. Cyanobacteria, a type of microalgae also known as blue-green algae, were the first organisms on Earth to photosynthesise. Using light as energy and converting carbon dioxide into oxygen in the process, cyanobacteria created the oxygen atmosphere that has allowed all life on this planet to evolve.

Top: The artist's desktop bioreactor growing *Athrospira platensis* microalgae (a freshwater variety of spirulina), 2021. Photo by Jessie French Right: An algae bioplastic cup coloured with *Athrospira platensis* microalgae, 2020. Photo by Jessie French.

- Spirulina, a type of cyanobacteria and also a microalgae, is the Earth's oldest living plant, estimated to have been growing for 3.6 billion years. They do not consume anything but light.
- Cyanobacteria are the evolutionary bridge between bacteria and green plants: all plants that perform photosynthesis contain a chloroplast, a structure within each cell of the plant that allow it to perform photosynthesis, which contains the genome of cyanobacteria.
- Microalgae form the basis for most food chains in both freshwater and oceans.
- In Western history, there is evidence that Aztecs and Mesoamericans used spirulina as a food source until the 16th Century, when the Spanish invaded and drained the lakes to use them for Western agriculture and urban development. There is also evidence that tribes in the African nation of Chad used spirulina as a food source.
- Spirulina is an ecologically sound, nutrient-rich food source that meets all the nutritional needs of humans. It is a complete food source. It requires no fresh water or land to grow, is easy to cultivate - I have spirulina bioreactors growing on my desk - and could provide a solution to food security and malnutrition as well as a viable alternative to livestock and traditional agriculture.
- Dried spirulina is 60-70% protein and contains the full range of amino acids which humans need to grow and function properly, but cannot make ourselves. In comparison, a steak is about 26% protein. Spirulina is high in vitamin B12 and contains antioxidants including betacarotene, vitamins B1, B2, E and minerals iron, magnesium, calcium and phosphorus. Spirulina is one of the only plant sources of iron.
- Spirulina is highly alkaline. Its growth in oceans can combat ocean acidification and it can process carbon into oxygen at 4-5 times the rate of a mature tree.

Based in Naarm/Melbourne, Australia, the work of Jessie French explores speculative futures through algae-based bioplastic and ocean ecologies. Housed within an ethos of consumption, sustainability and regeneration, her practice invites others to engage with the possibilities of a post-petrochemical world. Through experimenting with other materials, she explores the potential of closed-loop systems of (re)use and conscious consumption and interaction with objects.

French acknowledges the Wurundjeri and Boon Wurrung People of the Kulin Nation as the traditional custodians of the land on which she lives and works, who are among the oldest living cultures in human history and who have one of the longest creative human histories on Earth. She pays her respects to Elders of the community - past, present and emerging - and extends this respect to all First Nations people. She recognises that sovereignty was never ceded. The place she calls home has a rich history and its First Nations peoples have unique cultural and spiritual relationships to the land, waters, seas and all living things within them.

First page: *Speculative bioplastic future.* Rendered by Nic Hamilton.

The name of the epoch we live in is contested. One proposed new name, anthropocene, suggests that the trail of petrochemical trash that humans have produced, will leave a mark in the current layer of rock strata. While we uncovered fossils from the past, our time on Earth may be marked, overwhelmingly, by Bic™ pen casings and other so-called disposable items. Plastics made to fulfil a short-term purpose leave traces that last longer than our lifetimes.

My work explores the meaning and value of the ephemeral; placing value in things that don't last beyond our lifetimes and challenging our obsession with the idea of 'built-to-last', which largely fails to consider the ecological and social impacts of this everlasting durability. Why is it that objects that leave a geological mark lasting an epoch are so readily available and priced so cheaply, when we fail to consider their enduring environmental burden?

Through my work – both material research and production – I engage with and confront our contemporary environmental crisis. I propose everyday solutions within the frame of human production and consumption.

Portrait, 2019. Photo by Benjamin Thompson.

WE ARE LIVING ON A DAMAGED PLANET.

SPECULATING ON A RADICALLY SUSTAINABLE SEAWEED FUTURE HAS NEVER FELT MORE URGENT.

THERE IS HOPE IN IMAGINATION – THIS WORK IS A FIELD TRIP TO ANOTHER WORLD, A SEAWEED FUTURE.

Inviting people on an expedition to an alternate future can take the form of exhibitions, performances, participatory workshops, meals, discussions and experimentation that immerses visitors in an alternate world – a seaweed future.

I speculate on what it would mean if a global price on waste and environmental depletion were introduced.

I imagine a possible future where the use of bioplastics is enabled by a DIY, bottom-up solution that proposes an alternative to our species' problem with single-use plastics and infrastructural ties to petrochemical plastics.

Speculative bioplastic future. Rendered by Nic Hamilton.

This period in history, is a time of unlearning. We have forgotten how to live without waste. Our ways of living have been altered unsustainablly without alternatives. We must re-learn how to live in a post-sustainable world, where sustainability isn't a buzz word born of an unsustainable way of life, but the way we live.

Deborah Bird Rose, anthropologist, multispecies ethnographer and expert in extinction studies, developed the concept of a double death. In this era of extinctions, a double death is allowing the death of resilience and renewal, as well as 'unraveling of the work of generation upon generation of living beings' and 'the death of temporal, fleshy, metabolic relationships across generations and species'. I work with these ideas in mind, to explore what it means to have hope at this moment in time. To use Donna Haraway's term, I work to generate stories for possibility, for new ways of living and giving heart for change.

My work, currently focused on exploring marine bioplastic, is an exercise in play, that gives access to new models for living on this damaged planet.

Plastic is a polluted word.

Its meaning was hijacked by industrial revolution. It has become what we consume.

Petroleum: algae fossilised over millions of years. Cheap fossil fuels. What is the cost to extract it from the earth?

What is disturbed. Extracted. Unequally laboured along socioeconomic lines.

Species lines. Life lines. Human cost. Living cost. Opportunity lost. Infrastructural default, no option but to pollute, technocapitalism.

In biology, plasticity is an organism's ability to adapt to change.

In neuroscience, neuroplasticity is a measure of how we can change by learning new skills or adapt to a new way of living.

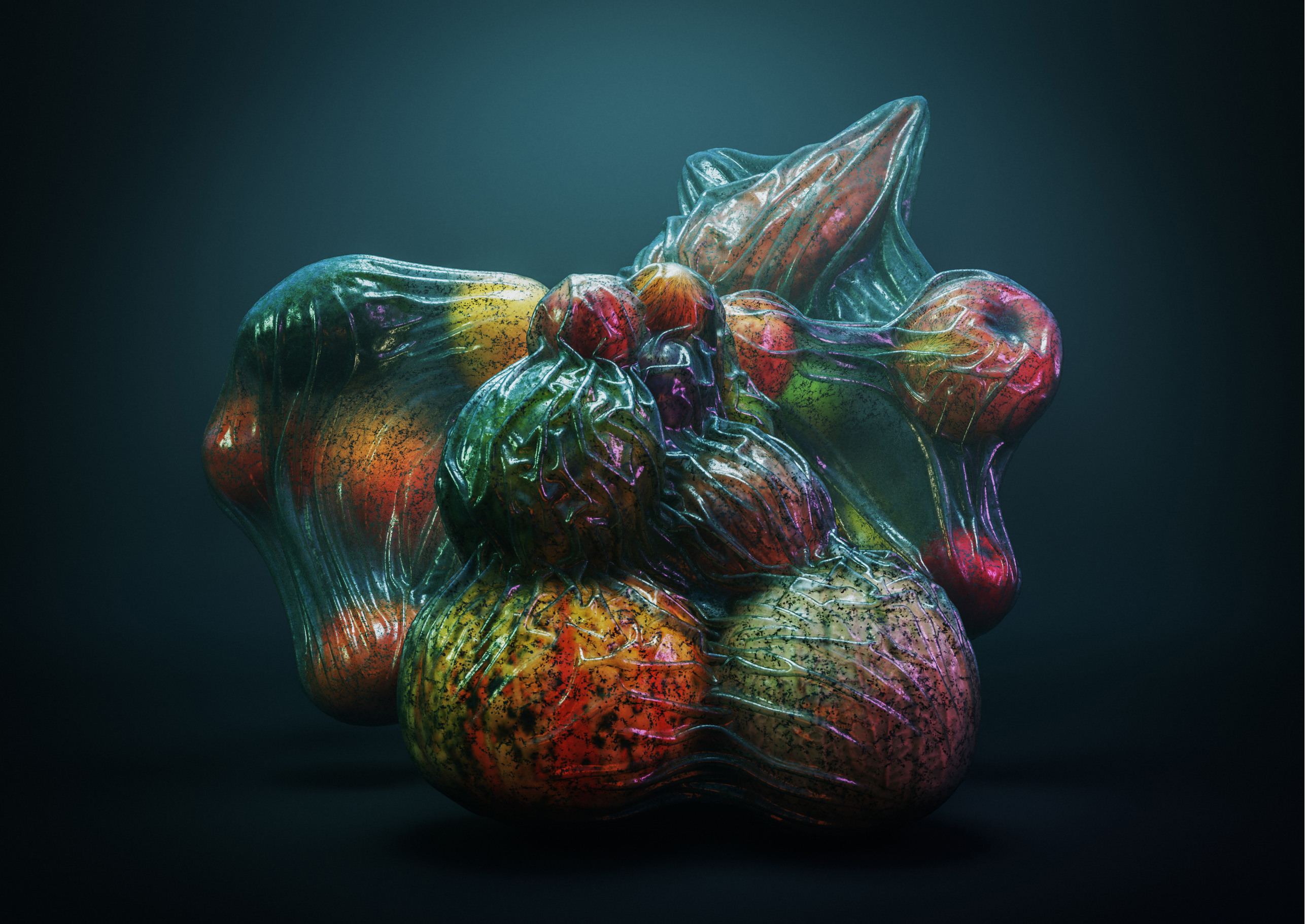
OTHER MATTER was founded in 2020 by Jessie French, and launched publicly in 2021 as a means of sharing her skills and knowledge in working with algae-based bioplastic to achieve specific material outcomes.

- OTHER MATTER is the first bioplastic design studio in the world where bioplastic items can be ordered to specification and research and design for projects can be undertaken.
- So far, OTHER MATTER has worked to provide bioplastic for application in exhibition design, experimental interior architecture and scenography. These projects have allowed for real-world proof of concept and the replacement of petrochemical plastics in some projects.
- The studio is currently working with multidisciplinary designers, cultural organisations, a textile designer, lighting prototypes, ceramicists and choreographers.
- Jessie French works as both an independent artist under her own name and under the studio name OTHER MATTER. Either title is appropriate, however if public workshops are involved, it is preferred that these be credited to OTHER MATTER as well as Jessie French.

OTHER MATTER is an experimental studio working with algae-based bioplastics.

Through the design of materials, objects, experiences and futures, we invite others to engage with the possibilities of a post-petrochemical world.

Next page: *Speculative bioplastic future* rendered by Nic Hamilton.



The plastics I make are safe enough to eat.

They can easily be transformed into new items easily in a home kitchen.

They are completely biodegradable and compostable in a residential system.

They break down within a month or so, depending on the weather, contribute towards rehabilitating topsoil and can be a food source for water-dwelling creatures should they find their way there. These plastics will not leave a geological trace.

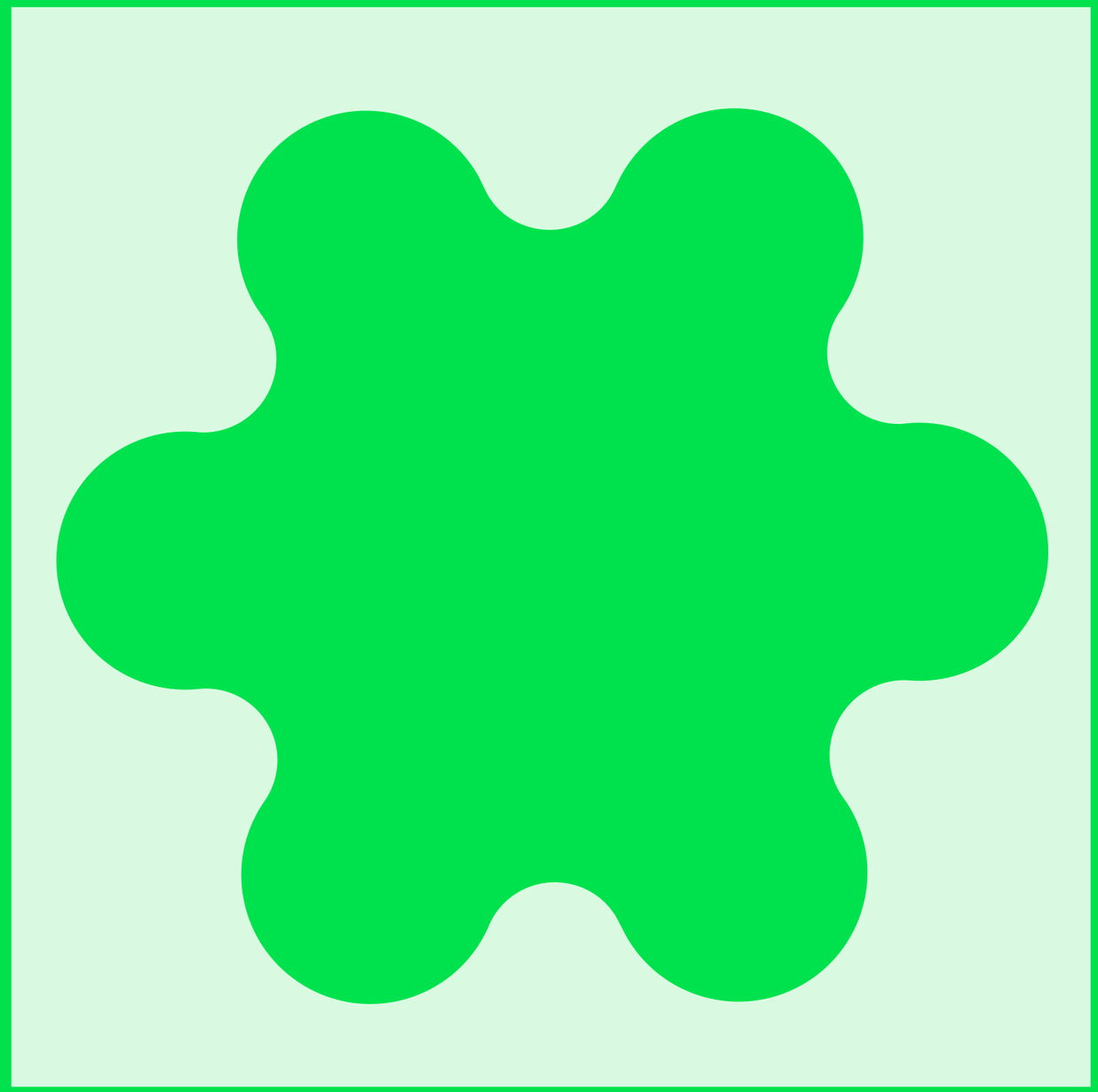
If discarded, they are beneficial for the environments they land in.

Within soil, the hydrophilic nature of the material lends itself to sustaining moisture content as well as providing a food source for worms, microbes and other creatures.

From old algae – which petroleum is made from – to new algae that can rehabilitate oceans and the atmosphere through its sustainable production and harvest.

I currently use an extract from red algae as a polymer alongside other organic ingredients to create non-petrochemical plastics. I have undertaken research tracing the supply chain of this polymer back to the ocean to ensure the sustainability of its harvest and production.

Supply chain research



As part of research conducted while on residency in Morocco in early 2020, I visited sites of the agar supply chain to investigate the sustainability of the material and potential issues surrounding its use in my practice.

I and met with marine experts, agricultural scientists, teams developing aquaculture initiatives, local harvesters as well as the directors and lab technicians at the only agar processing plant in Africa, Setexam, which produces more than half the world's bacteriological agar and a good majority of food and other technical agars.

Photo: *Gelidium sesquipedale*, the red macroalgae used to make high-quality agar which the artist uses to make bioplastic, held by the artist at a harvesting site in Sidi Bouzid, Morocco. Photo by Jessie French.

SUPPLY CHAIN RESEARCH

As part of the research I conducted while on residency in Morocco in early 2020, I visited sites of the agar supply chain to investigate the sustainability of the material and potential issues surrounding its use in my practice. During this time, I met with a range of marine experts, agricultural scientists, people developing aquaculture initiatives, local harvesters and directors and lab technicians working at the only agar processing plant in Africa, Setexam, which produces more than half the world's bacteriological agar and a good majority of food and other technical agars. This documentation is part of this research.

INDEPENDENT HARVESTERS

Taken in Sidi Bourzid on the coast of Morocco, these images show local harvesters, often women, collecting red algae from the ocean. Havesters dive to collect seaweed, however this practice is now regulated and requires sites for harvest be inspected by an independent marine biologist and permits be issued by the Government that are linked to licenses issued to processing partners. These measures were put in place in the 2010s to combat overharvesting and maintain sustainable practice.

LOCAL PROCESSING

Seaweed collected by harvesters is dried and shaken out to remove losse sand and salt, then sold by weight to the processing plant. In Africa, the only processing plant is Setexam, which is a third-generation family business started by a marine biologist couple who recognised the value of the local seaweeds and began the company in 1960 – a catalyst for the development of the industry.

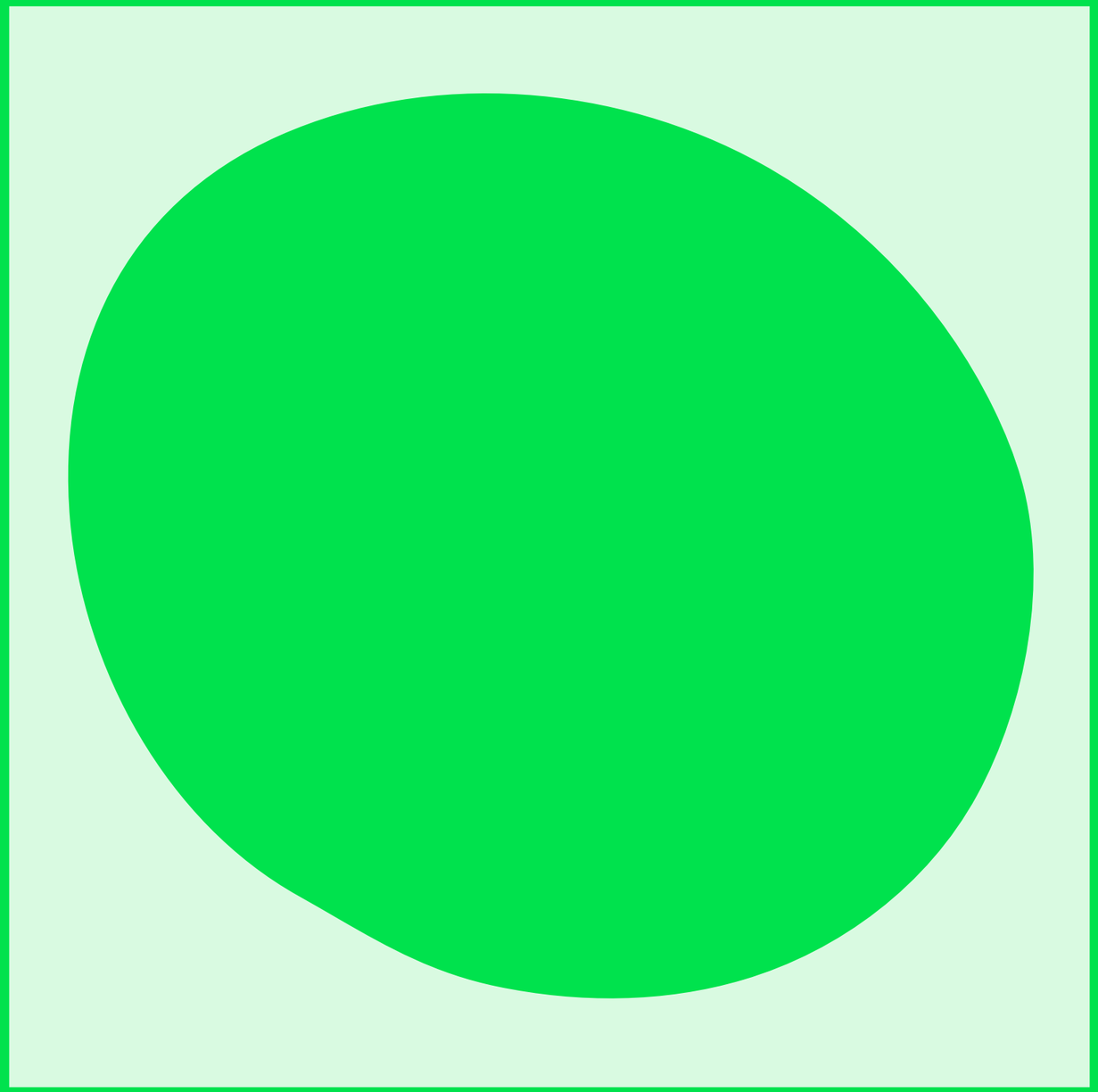
Agar is processed simply through a mostly water and heat based extraction process to refine the gellifying polymers. Laboratory scientists test for purity and adjust to the highly specified needs of their customers in industries ranging from biomedical research to fast moving consumer goods.

In 2014, Setexam led an initiative with the Moroccan Government which saw the introduction of the country's first controls to sustainably protect seaweed harvesting.

(Left) Local harvester in Sidi Bouzid, Morocco. (Middle, top) Local harvesters in Sidi Bouzid. (Centre, middle) Dried *Gelidium sesquipedale* red macroalgae as it arrives from harvesters to the processing plant in Kenitra, Morocco. (Centre, bottom) Lab technicians testing and analysing processed agar in Kenitra, Morocco. (Right) Processed agar being tested in the laboratory at Setexam's processing plant in Kenitra, Morocco. All photos by Jessie French.


2000
APPROX
1500
1000
DLAB
Heat
Stir

Work



This page: Bioplastic tableware vessels, 2021. Algal polymer extracted from Gelidium sesquipedale macroalgae, Athrospira plantesis microalgae, algal carotenes obtained from Dunaliella salina microalgae, plant-based glycerine plasticiser, gelatin. Photo by Pier Carthew. Art Direction by Thalea Economo.

Previous page: Bioplastic tableware vessel, 2021. Algal polymer extracted from Gelidium sesquipedale macroalgae, Athrospira plantesis microalgae, algal carotenes obtained from Dunaliella salina microalgae, plant-based glycerine plasticiser, gelatin. Photo by Pier Carthew. Art Direction by Thalea Economo.

Next page: Bioplastic tableware vessels, 2021. Algal polymer extracted from Gelidium sesquipedale macroalgae, Athrospira plantesis microalgae, plant-based glycerine plasticiser, gelatin. Photo by Pier Carthew. Art Direction by Thalea Economo.

EXHIBITION

This page: *A Sea at the Table*, 2021. Installation view. Algae-based bioplastic made with algal polymer extracted from gellidium sesquipedale, terrestrial plant-based plasticiser, algal pigments: athrospira platensis and algal carotene extracted from dunaliella salina. Photo by Tom Ross.

Following pages:

(1) *A Sea at the Table*, 2021. Installation view. Photo by Emile Zile.

(2) *A Sea at the Table*, 2021. Installation view. Photo by Tom Ross.

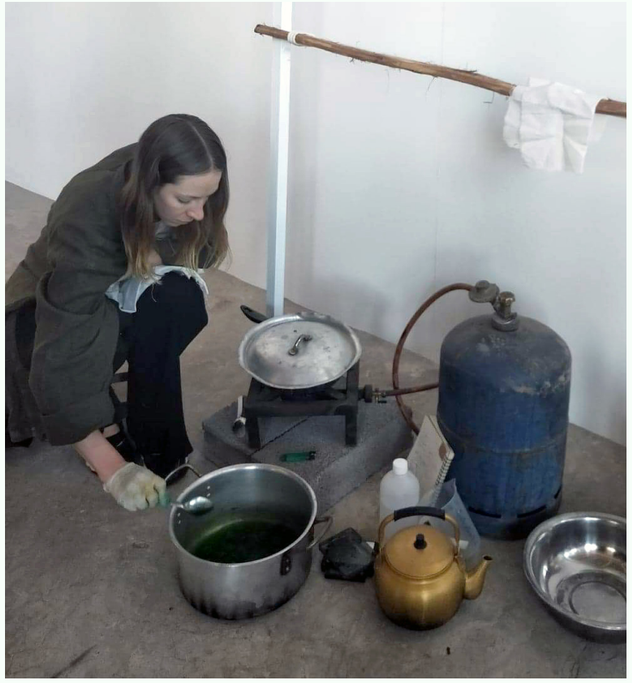
(3) *A Sea at the Table*, 2021. Installation view. Photo by Tom Ross.

All exhibited at OTHER MATTER STUDIO, Melbourne, Australia, from 26 March to 8 April 2021, as part of Melbourne Design Week 2021.


ABLE

This page and previous: Bioplastic bowl, 2020. Top view and side detail. Algal polymer extracted from Gelidium sesquipedale, plant-based glycerine, gelatin, spirulina microalgae. Photos by Jessie French.

EXHIBITION



This page: The artist during a live bioplastic making session within the exhibition, 21 February 2020. Photos by Lichen Kelp.

Previous page: *Seaweed Future: Red Gold*, 2020. Installation view featuring bioplastic lab. Photo by Jessie French.

Following pages:

(1) *Red Gold*, 2020. Front and detail. Algae-based bioplastic made with Moroccan gelidium sesquipedale, whole gelidium sesquipedale.

(2) *Fragility*, 2020. Installation and details. Algae-based bioplastic made with Moroccan gelidium sesquipedale and vegetable glycerine, mineral pigment.

(3) *Symbiosis*, 2020. Installation and details. Algae-based bioplastic made with Moroccan gelidium sesquipedale and vegetable glycerine, mineral pigment.

All exhibited at *Seaweed Future: Red Gold*, Marrakesh, Morocco, 19-27 February 2020, part of the *1-54 Contemporary African Art Fair*. Detail photos by Roxane Alaime Bauzå.

1

CV

JESSIE FRENCH
B. 1988, MELBOURNE, AUSTRALIA

JESSIE FRENCH IS AN ARTIST AND EXPERIMENTAL DESIGNER WORKING WITH ALGAE-BASED BIOPLASTIC. HER PRACTICE EXPLORES CONSUMPTION, SYMBIOSIS, ECOLOGY, SCIENCE AND TECHNOLOGY IN THE CONTEXT OF HUMAN EXPERIENCE AMIDST HUMAN-DRIVEN ENVIRONMENTAL CRISIS. SHE IS INTERESTED IN ENGAGING WITH ENVIRONMENTALLY VITAL ISSUES AND EXPERIMENTAL ARTISTIC PROJECTS REFRACTED THROUGH THE LENS OF SCIENCE.

SELECTED EXHIBITIONS PERFORMANCES AND PRESENTATIONS

[Upcoming and current]
[TBA] Elemental Construction,
Melbourne Design Week, March 2021

An solo exhibition of collaborative work with Fluff Corp exploring bioplastic glazing on ceramics.

23rd Biennale of Sydney - rīvus,
The Cutaway, Barangaroo, Sydney, March 2022

An exhibition with a strong focus on sustainability and collaboration bringing together existing and commissioned projects worldwide around rivers and waterways. Curated by José Roca.

Victorian Craft Awards exhibition,
Craft Victoria, Sydney, April 2022

An exhibition of selected finalists work.

[TBA] We are all bees now,
Bus Projects, April 2022

An exhibition of work by artists who are practicing beekeepers reflecting on collectivity, symbiosis and earthly survival. Featuring artists including Stanislava Pinchuk, Jessie French and Nic Dowse.

[TBA] OTHER MATTER,
Salamanca Arts Centre, Hobart and The Barracks, New Norfolk, Tasmania, August 2022

A major solo multi-site exhibition.

[TBA] TERRA,
West Space, November 2022

Collaborative contribution to Joel Spring and Victoria Pham's commissioned work.

[Past]
Future Form,
Craft Victoria Member's Vitrine, July 2021

An solo exhibition of algae-based bioplastic tableware vessels.

OTHER MATTER in NYC,
Savvy Studio, New York, July 2021

An solo exhibition of algae-based bioplastic tableware vessels curated by Grace Denis and launched with a curated dining event by mescal producer Yola Jimenez and artists Grace Denis and Chloe Wise.

A Sea at the Table,
OTHER MATTER STUDIO, Melbourne Design Week, March 2021

A solo show of bioplastic vessels and collaborative objects made with Fluff Corp consisting of a range of ceramic items glazed with bioplastic.

Seaweed Salon,
Ars Electronica, September 2020

An online workshop series featuring a how-to guides to making bioplastic.

Life and Death, Meat Market Stables, Melbourne Design Week, March 2020

A group exhibition of Australian designers exploring the life and death of objects.

Seaweed Future: Red Gold,
Marrakesh, Morocco, February 2020

An exhibition curated by Roxane Alaime Bauzå presenting work developed during La Pause artist residency, as part of the 1-54 Contemporary African Art Fair.

SELECTED PUBLICATIONS

[Upcoming]
[TBA] A Glossary of Water, early 2022

This will be the main publication for rīvus, co-edited by José Roca, artistic director of the 23rd Biennale of Sydney and Professor Juan Francisco Salazar of Western Sydney University. *A Glossary of Water* will be a significant 496-page book that brings together texts, documents and images related to the exhibition and curatorial research but also materials beyond the exhibition proper.

[Past]
In, From & With: Exploring Collaborative Survival,
Published mid-2021

Edited by Belgian-based curator and artist Grace Denis with a preface by Anna Tsing, this book includes contributions from twenty-six artists responding to the theme of collective survival. Contributors include Jessie French, David Horvitz, Loren Kronemeyer and the Institute for Interspecies Art and Relations.

Experimental Designer Jessie French is Shaping a Seaweed-centric Future, written by Sasha Gattermayr, published in The Design Files, 12 April 2021.

Melbourne Design Week grapples with 'messy contemporary realities', written by Emily Wong, published in ArchitectureAU, 12 April 2021.

Seaweeds and Sustainability, written by Emily McDermott, published in Berlin Art Link, 26 January 2021.

Positive Messages No. 1 (2020). Published by P.A.M and INNEN in Hungary featuring contributions from Jessie French, Peter Sutherland, Anna Tsing, Donna Haraway and Felicia Atkinson.

NOTABLE / PUBLIC COLLECTIONS

National Gallery of Victoria – ten pieces of Algae Bioplastic Tableware series held in collection.

NOTABLE RECOGNITION

*Shortlisted finalist**
Victorian Craft Awards 2021

Longlisted finalist - Sustainable Product
Dezeen Awards 2021

*Shortlisted finalist - Handcrafted, Sustainable Design or Initiative and Emerging Designer categories**
The Design Files + Laminex Design Awards 2021

*Shortlisted finalist - Functional Design^*
Northern Beaches Council Environmental Art & Design Prize 2021

*Winners TBA 21 October 2021.
^ Winner TBA - delayed due to lockdown in NSW.

SELECTED PROFESSIONAL PRACTICE

OTHER MATTER, founder, 2020—present

Honey Fingers Collective, beekeeper, 2018—present

Bus Projects, director's advisory circle, 2018—present

City of Melbourne, curator and creative producer, public programs, 2017—2019

The Place Agency, curator, 2018—2019

MPavilion, deputy creative director, 2016—2018, associate producer, 2015—2016, assistant producer, 2014—2015

All activities listed as TBA are to remain confidential to the reader until formal public announcement.

jessie@other-matter.com | +61 405 133 272

A RADICALLY SUSTAINABLE SEAWEED FUTURE HAS NEVER FELT MORE URGENT.

JESSIE FRENCH
JESSIE@OTHER-MATTER.COM
+61 405 133 272
OTHER-MATTER.COM
@OTHER_MATTER