Somnath Bhatt

NETWORKED GARDENS

Serpentine
Synthetic Ecologies Compendium
Season 1 Microbial Lores
Jul 07, 2022

CELLULAR TROMPE L'ŒIL
SENSORY INTIMACY
NON LINEAR TEMPORALITIES
STEWARDS OF KNOWLEDGE

Letter from the Editor

Serpentine Synthetic Ecologies Lab presents Compendium, a growing collective archive of resources, reflections, sketches, conversations, and content that support artistic and critical inquiry into ecology and life sciences. The inaugural season is Microbial Lores curated by Angela Dimayuga and a guild of extraordanry thought leaders. With focus on fermentation the archive deep dives into broad histories of knowledge and the invisible scales of life that govern not only our kitchens, but also our contemporary science, culture and technology.

Bringing artistic and scientific communities into experimental exchanges through iterative narrative building, and by contributing to the emergence of Synthetic Ecologies we are creating an intersectional field that investigates the interconnectedness of cultural inquiry and living systems in relation to adapting biological developments.

We believe that creativity is connecting the dots, sharing and building collectively paths less crossed. There is no wrong way of seeing. We invite you to walk along a path with us, and share your compendium of compendiums.

— Yasaman Sheri

The Compendium Guild who has collected and created the archive is made up of:

Yasaman Sheri	Principal Investigator
Angela Dimayuga	Chef, Cultural Producer, Transdisciplinary Artist
Nadia Berenstein	Flavour Historian
Namita Patel	Fermentation Scientist
Joshua Evans	Novel Fermentations Researcher
Lucy Chinen	Bio-based Materials Practitioner & Researcher
Seetal Solanki	Materials Translator
Claire L. Evans	Writer & Musician
Chiara Di Leone	Writer & Researcher
Alexander Boyes	Integrated Producer
Charles Broskoski	Co-founder Are.na

Table of Contents

1	Biodegradable Plastics - Can Polyhydroxyalkanoates Be Produced Efficiently From Waste Plant and Animal Oils?
2	Sustainability in Disposal of Single-Use Systems
3	Finnish scientists create 'sustainable' lab-grown coffee
4	Biofuel
5	Biofuel Production
6	Industrial fermentation to replace extraction from plants.
7	"Natto possible histories: a parcel of cooked soybeans gone bad"
8	tentative science around establishing 'new' tastes—what constitutes a taste conceptually? Typically I think it is often seen to require identifying a specific receptor (or receptors) in the mouth and a specific molecule (or molecules) that stimulate...
9	Substances that keep coming up when learning about insect fungus farming: Penicillin - to control bacteria that would sicken the fungus, comes from body of leaf cutter ant but obviously also antibiotic. Mold kills bacteria. Ethanol - ambrosia beetles...
10	A Philosophy of Recipes: Making, Experiencing, and Valuing
11	Mother Scobies
12	Domestication of Industrial Microbes

13	Evidence for the hallmarks of human aging in replicatively aging yeast
14	Material Memory is what sticks out to me. A lot of what has been passed through ancient traditions and where all of this knowledge and wisdom is traversing to now. Materials have been the vessels of holding this knowledge and are containing so m...

Biodegradable Plastics - Can Polyhydroxyalkanoates Be Produced Efficiently From Waste Plant and Animal Oils?

Biodegradable Plastics >"Polyhydroxyalkanoates (PHAs) are a potential replacement for some petrochemical-based plastics. PHAs are polyesters synthesized and stored by various bacteria and archaea in their cytoplasm as water-insoluble inclusions. PHAs are usually produced when the microbes are cultured with nutrient-limiting concentrations of nitrogen, phosphorus, sulfur, or oxygen and excess carbon sources. Such fermentation conditions have been optimized by industry to reduce the cost of PHAs produced commercially. Industrially, these biodegradable polyesters are derived from microbial fermentation processes utilizing various carbon sources."

>"Single-use components for biopharmaceutical manufacturing have a lower environmental impact than reusable components, but disposal is still a consideration."

Finnish scientists create 'sustainable' lab-grown coffee

by Sam Kingsley

Biofuel

source: biofuel | Definition, Types, & Pros and Cons | Britannica
Connected by Namita Patel

Biofuel Production

source: Shedding light on dark fermentation for biofuel production
Connected by Namita Patel

Industrial fermentation to replace extraction from plants.

“In contrast to what most people might think, citric acid is not—or not anymore—isolated from citrus fruits, but is industrially produced by the filamentous fungus A. niger. The process was pioneered by James Currie, a food chemist, who 100 years ago published a study describing the superior properties of A. niger for the industrial production of the acid [3]. In particular, Currie showed the necessary growth medium for citric acid biosynthesis, and the ability of the fungus to grow at low pH (2.5–3.5), while still being able to produce high amounts of the metabolite. Moreover, this work demonstrated the direct correlation between amount of substrate in the medium and amount of product, laying the basis for modern-day industrial fermentation of citric acid [3]. In contrast to other species of fungi that had been reported to produce citric acid by 1917, every single strain of A. niger that Currie tested could efficiently produce this molecule when grown in sugar solutions. Two years later, the American company Pfizer made a pilot plant for biochemical production of citric acid, and by the mid 1920s, production using A. niger fermentation far outweighed extraction from citrus fruits [4].”

"Natto possible histories: a parcel of cooked soybeans gone bad"

The earliest versions of natto were made from steamed soybeans wrapped in rice straw.
KOICHI KAMOSHIDA/GETTY IMAGES

tentative science around establishing 'new' tastes—what constitutes a taste conceptually? Typically I think it is often seen to require identifying a specific receptor (or receptors) in the mouth and a specific molecule (or molecules) that stimulate it/them. But there might also be controversy here.

Substances that keep coming up when learning about insect fungus farming: Penicillin - to control bacteria that would sicken the fungus, comes from body of leaf cutter ant but obviously also antibiotic. Mold kills bacteria. Ethanol - ambrosia beetles are attracted to sick trees with ethanol to start their garden. - Lucy

limited to human evolution, physiologies, and industry).

The "surroundings" we share with microbial life are many given their ubiquity; our bodies, our dwellings, and our ecological niches are "ours" as multiple species, shared in instances of perpetual (at times risky) cohabitation. In this sense, attunement

Mother Scobies

Outline

Main Text
Acknowledgments
References
Show full outline

Cited By (54)

Figures (2)


Tables (2)

Table 1
Table 2

Current Biology
Volume 29, Issue 10, 20 May 2019, Pages R381-R393

Review

Domestication of Industrial Microbes

Jan Steensels [1, 2, 3, 4], Brigida Gallone [1, 2, 3, 4], Karin Voordeckers [1, 2, 3], Kevin J. Verstrepen [1, 2, 3]

https://doi.org/10.1016/j.cub.2019.04.025

Domestication refers to artificial selection and breeding of wild species to obtain cultivated variants that thrive in man-made niches and meet human or industrial requirements. Several genotypic and phenotypic signatures of domestication have been described in crops, livestock and pets. However, domestication is not unique to plants and animals. Microbial diversity has also been shaped by the emergence of novel and highly specific man-made environments, like food and beverage fermentations. This allowed rapid adaptation and diversification of various microbes, such as certain *Lactococcus*, *Lactobacillus*, *Oenococcus*, *Saccharomyces* and *Aspergillus* species. During the domestication process, microbes gained the capacity to efficiently consume particular nutrients, cope with a multitude of industry-specific stress factors and produce desirable compounds, often at the cost of a reduction in fitness in their original, natural environments. Moreover, different lineages of the same species adapted to highly diverse niches, resulting in genetically and phenotypically distinct strains. In this Review, we discuss the basic principles of microbial domestication and describe how recent research is uncovering its genetic underpinnings.

Previous article in issue Next article in issue

Main Text

Introduction

Darwin's theory of evolution describes how species change over time

Evidence for the hallmarks of human aging in replicatively aging yeast

>"Recently, efforts have been made to characterize the hallmarks that accompany and contribute to the phenomenon of aging, as most relevant for humans 1. Remarkably, studying the finite lifespan of the single cell eukaryote budding yeast (recently reviewed in 2 and 3) has been paramount for our understanding of aging."

Material Memory is what sticks out to me. A lot of what has been passed through ancient traditions and where all of this knowledge and wisdom is traversing to now. Materials have been the vessels of holding this knowledge and are containing so much memory, memories that are connected to the human and also what is being contained/fermented. This timeline that we can focus on for this would be western science meets indigenous science, so that we are including both perspectives and all of the in between. The materials are a way of passing on knowledge so to speak and now these materials are being reinterpreted for our needs today but also being rediscovered - old meets new or familiar meets unfamiliar.