

**EAT  
LESS  
LIVE  
MORE**

---

**& PRAY  
FOR BEANS**

“Would you tell me, please, which way I ought to go from here?”  
“That depends a good deal on where you want to get to,”

Alice in Wonderland, Lewis Carroll

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# DESIGNERS & ARTISTS FOR GENOMICS AWARD

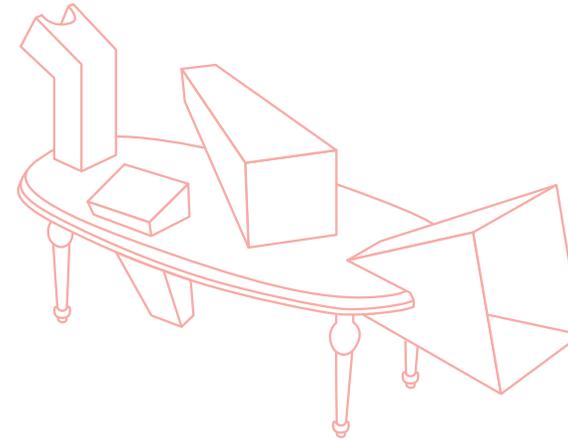
## PREFACE

This book documents the Center for Genomic Gastronomy's project *Eat Less, Live More, and Pray For Beans*, which was funded by the Designers and Artists for Genomics Award (DA4GA). From January to May 2012 we were paired with scientists from the Netherlands Consortium for Healthy Ageing (NCHA), who were just starting a new research project called *Growing Old Together*.

In the *Growing Old Together* study, human subjects are required to eat less and exercise more. The NCHA scientists aim to measure the results of these lifestyle changes, also taking into account the genetic diversity of the patients. The NCHA are interested in researching the genetic diversity of individuals. We proposed to look at the diversity of the food system these individuals live within, and how it might change in the future.

While in the Netherlands, we investigated both local and global food histories and current food trends. We met with food scientists, nutritionists, chefs and families. These experiences informed the development and final form of our DA4GA project.

Each of the four food futures and associated recipes we imagine here emphasize a slightly different collection of genomes and technologies than the food system we have today. The future scenarios we present are not predictions of what will happen, but are tools for imagining



how various individuals, organizations and governments might initiate and react to changes in the composition of the food system.

The practice of Science and Art are both driven by a curiosity about the world and the desire to ask interesting questions. The methods and outcomes of these two disciplines can be widely divergent or can have significant overlap. As artists, we don't claim to discover Truth. We see value in speculating widely, creating novel experiences and teasing out assumptions we have about the world.

In this project we wanted to utilize taste, flavour and ingredient selection as strategies for exploring and knowing the world. The recipes that you find in this book are one way that you can repeat and verify our work. We hope you take the opportunity to try one out yourself and report back on your findings.

One of the things we hoped to have contributed to our colleagues in the life sciences and healthy ageing research community is a more diverse, critical and holistic way of imagining the future of food, and healthy ageing—even though the future isn't quantifiable or verifiable ahead of time, and never will be. It can only be lived and tasted.

Agriculture and cuisine are always changing and the healthy agers of tomorrow will face different food constraints and decisions than we face today. How will we decide which ingredients will compose the food of the future?

*Zack Denfeld & Cathrine Kramer*  
*The Center for Genomic Gastronomy*

This publication was produced as a component of the DA4GA project, which culminated in an exhibition at the Naturalis Museum in Leiden, The Netherlands from June 7th–December 2012.



## INTRODUCTION

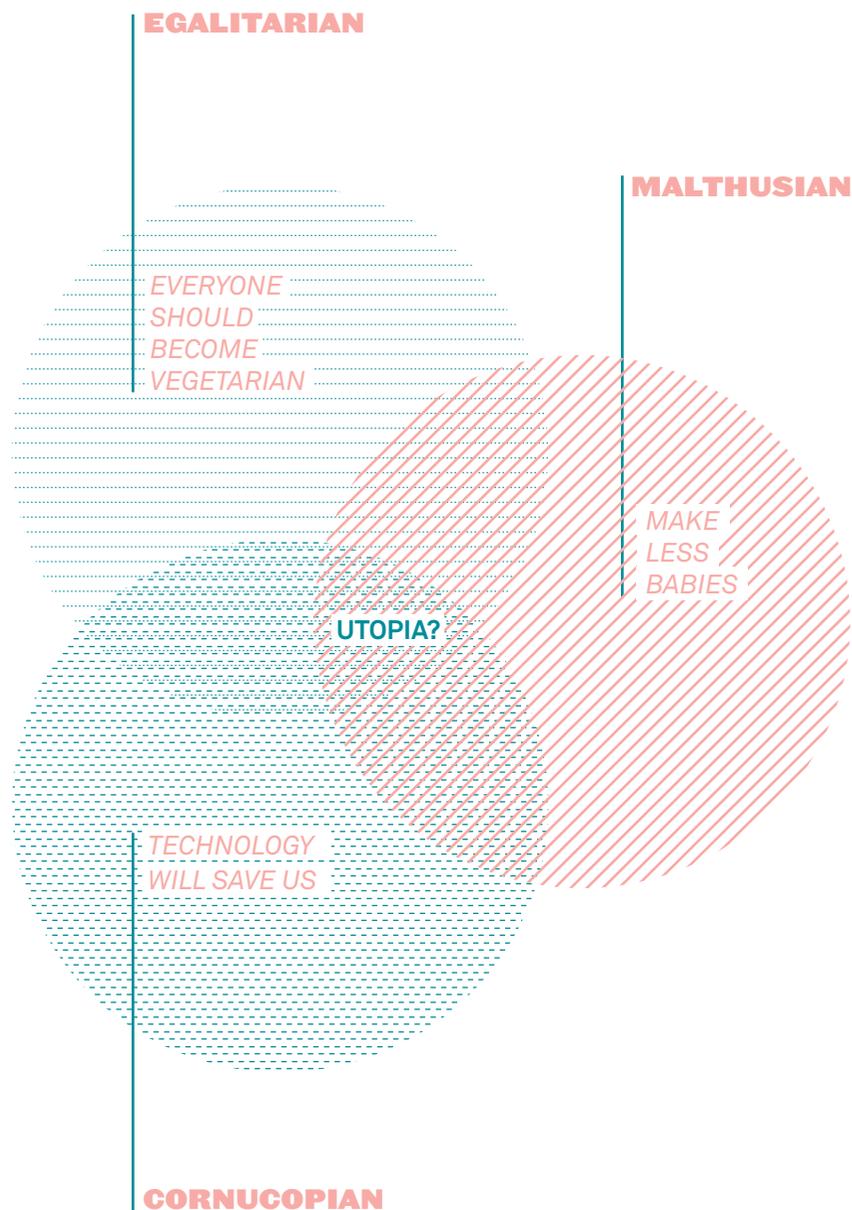
Today most people in Europe buy their food at supermarkets, where it is common to find vegetables wrapped in plastic, energy drinks and a variety of food powders. Three capsicum neatly packaged. Red, yellow and green. A redbull to get you through the day. And perhaps a cake for dessert – just add water.

Is this what futurists and dreamers of the past had in mind when they imagined the food of the 21st century? Many ideas of what the future will bring are cyclical, such as the reoccurring ideas of pill foods, nutraceuticals and food factories producing endless supplies of algae or insects. Rather than offering accurate prophecies, these ideas tend to represent the hopes, fears and cognitive biases of a particular era.

Many ideas, such as dinner-in-a-pill, have yet to make the journey from novels and movies to the plate. While others, such as lab-grown meat, have inspired scientists to initiate work in the lab. In the Netherlands, there is currently a large research initiative underway, with the aim of making In-Vitro meat a viable food product. However, there are still many technical barriers and it is unclear if it will ever be successful on the market. The debate over genetically modified food is a good example of how the success of a new food relies just as much on consumer perception and marketing, as it does on technical feasibility.

With this book, we hope to introduce an unfamiliar perspective of the future, viewing food not simply as a nutritional input for the human machine, but also a means of communication, contestation and pleasure.

# AN INCOMPLETE HISTORY OF THE FUTURE OF FOOD



“As for the answers to the big question itself—will there be enough food?—**Malthusians** say no. Since population growth will eventually outrun food production, a balance can be achieved only through either the preventive, discretionary ‘checks’ of birth control or voluntary conservation or nature's more onerous checks, primarily hunger, famine, and resource wars. Meanwhile, in the immediate future, while these forces come into play, we may be dining on less meat (which is resource-intensive) and more grain.

Voicing techno-optimism, **cornucopians** believe we can have our babies and our steaks, too. Following Condorcet, they believe scientific and technological ingenuity can feed many more people.

For the past two hundred years the futurists of these two schools have been mainly white, upper-middle-class British and Euro-American men working at top universities, corporations, foundations, and government agencies—the collective think-tanks housing those closest to the food policy establishment. Meanwhile, the **egalitarians**, relegated to the policy-making sidelines have struggled to be heard.”

*Meals to Come: A History of the Future of Food,*  
Chapter 2: The Debate—Will the World Run Out of Food?  
Warren Belasco

In the contemporary debate about food scarcity and abundance, each movement has an 18th century forefather.

**MALTHUSIANS**  
Thomas Malthus (1766-1834) believed that humanity's capacity for reproduction would always outrun carrying capacity or technological advances.

**CORNUCOPIANS**  
Marquis de Condorcet (1743-94) believed that science, industry and good governance would always create more food for everyone.

**EGALITARIANS**  
William Godwin (1756-1836) believed that people could change their habits and behaviors in order to share in nature's bounty.

# FOOD FUTURISM

One goal of this project was to develop four distinct and non-normative ways to think through the future of food systems. Looking at historical forecasts about the future of food, we kept coming across projections that focused almost exclusively on scientific and technological change. On our very first visit to the Naturalis museum in Leiden we saw a timeline in the Biotechnology exhibit that made predictions about the future up until the year 2150. (see, □ items at right). Seemingly written with an engineering mindset, these predictions leave little room for ‘human factors’.

But science and technology do not exist in a vacuum. They are embedded in a complex system, with social, economic and political drivers. During the DA4GA exhibit, our project will be installed one floor up from the Naturalis biotechnology timeline. We hope that our collection of narratives and recipes serve as a counterpoint to techno-deterministic and top-down predictions.

Thinking about the future is a tool for articulating a range of hopes, desires and fears. So, rather than repeating the tired visions of corporate smart-pills, it’s time to ask ‘what does the future taste like?’ and expect the unbelievable.

- 1993 ▲ Pill meals are synthesized in laboratories. There is no need for women to be enslaved in the kitchen or to kill animals for meat. "Slaughterhouses are converted into conservatories and beds of bloom."
- 1999 ● Through the application of science, mankind has created rooftop algae ponds and fully automated push-button farms.
- 2014 The nation of Greece defaults on its debts and exits the Eurozone, bringing back the *drachma* as its currency.
- 2015 Community Meat Labs start to sprout up in hacker spaces around the world.
- 2018 European farmers begin to intentionally infect their maize fields with the fungus *Ustilago maydis* as a protest against EU production quotas. They illegally harvest the mushrooms and sell them to the last remaining boutique restaurants.
- 2020 The Eurozone is now totally dissolved and the Netherlands returns to the *guilder* as its currency. The new unit of account is fixed to energy availability, using a formula of carbon credits and a floating EROEI multiplier.
- 2021 China now consumes over 50% of the meat produced in the world. The Netherlands exports 80% of its pigs and pork products to China, while Dutch citizens can't afford meat.
- 2022 □ "Cloning humans is by now medically safe, and the ethical objections are diminishing."
- 2024 Increasingly angry citizens begin to secretly infect fields of maize with *Ustilago maydis*, preventing maize from being shipped out of the country to feed foreign livestock.
- 2025 The Netherlands initiates a mandatory bioconscription initiative: every citizen is required to grow and collect seeds once every three years. This is supported with mandatory S.E.Ed.S. gardening curriculum from age 8 and up.
- 2026 There are riots over the high price of meat in the Netherlands. Violent clashes in Rotterdam force the government to institute a meat ration act with every citizen entitled to 100g of bacon a week.

- 2028 In a gruesome murder case a teenager is found drained of all blood, which was used as a growth medium for In-Vitro meat in one of the last remaining Community Meat Labs.
- 2030 ◆ The world is virtually without agriculture and farming has become a rich man's hobby. Food factories synthesize nutrients from sunlight and synthesized proteins are converted into self-reproducing steaks.
- 2031 Asia begins supplying humanitarian food aid to Europe which still hasn't recovered from the food riots of the 2020s.
- 2032 The foreign minister of India develops a 'Pray for Beans' marketing campaign to encourage Dutch citizens to eat healthily, and to improve the protein deficiency that has been identified in the Dutch population.
- 2045 □ "Barren areas, such as deserts, are now used for agriculture. Genetically engineered crops have made these areas fertile."
- 2060 The Netherlands is celebrated as a European innovator as it becomes the primary viable seed bank for continental Europe, which has now become an economic backwater.
- 2075 □ "People live even longer; hence the age of retirement rises to eighty years."
- 2080 Rising temperatures and sea levels are reducing the amount of arable land in Holland. Despite popular support and stiff penalties, the Dutch bio-conscription initiative is difficult to maintain. Most Dutch people survive almost entirely on food aid from Asia.
- 2100 ● The 20 Billion humans now living on the planet are surviving on a diet of "sawdust, seaweed & synthetics".
- 2135 □ "The last farm is closing down. Our food is increasingly being produced from algae grown in huge tanks."
- 2150 □ "We have solved all of the mysteries of DNA, but have still not managed to eradicate diseases and death."
- 2176 ■ The 15 Billion humans on Earth are able to eat a meat-heavy diet but some choose to eat less meat and more algae, yeast, super cereals and soy analogues.

- ▲ 1893: Written by Kansas activist Mary E. Lease
- 1956: From 1999 - *Our Hopeful Future* by Victor Cohn
- ◆ 1930: From *The World in 2030 AD* by Frederick Edward Smith, Earl of Birkenhead
- 1956: From *The Saturday Review* publication by Edgar Ansel Mowrer
- 1976: From *The Next 200 Years* by Herman Kahn

Each of the above predictions are drawn from *Meals to Come: A History of the Future of Food* by Warren Belasco

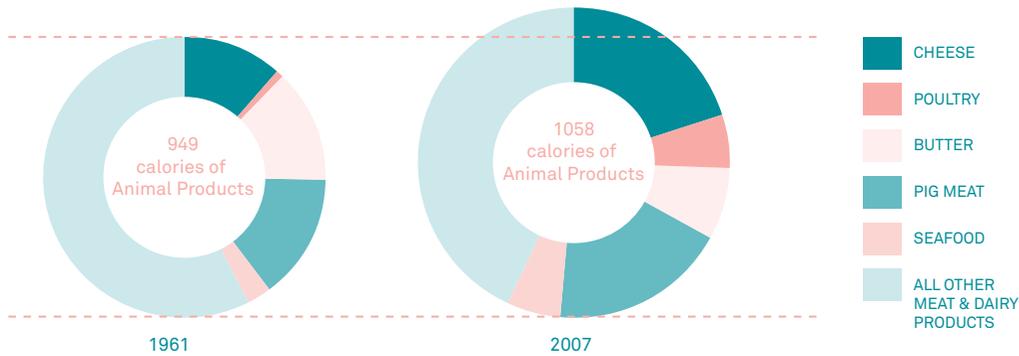
- These assertions are quoted from the timeline in the Biotech exhibit at the Naturalis Museum, Leiden, The Netherlands. Recorded 2012.

## SOME TRENDS RESHAPING THE DUTCH FOOD SYSTEM

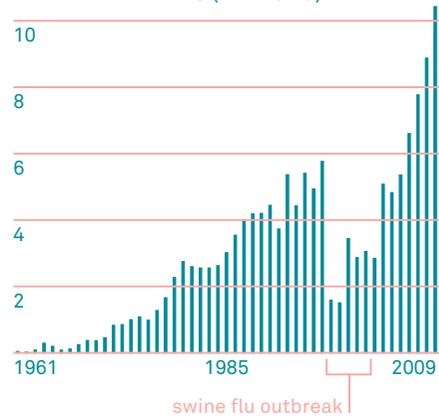
SOURCE: UN FAO

### ANIMAL INGREDIENTS

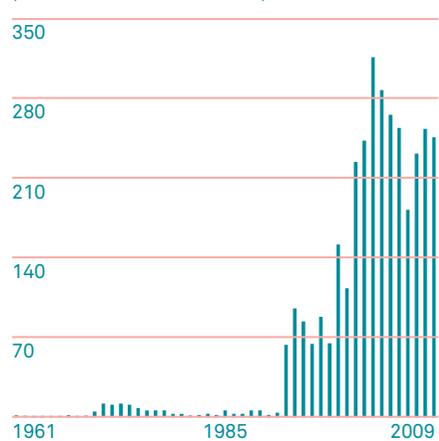
CHANGE IN DUTCH ANIMAL-PRODUCT CONSUMPTION, 1961 - 2007



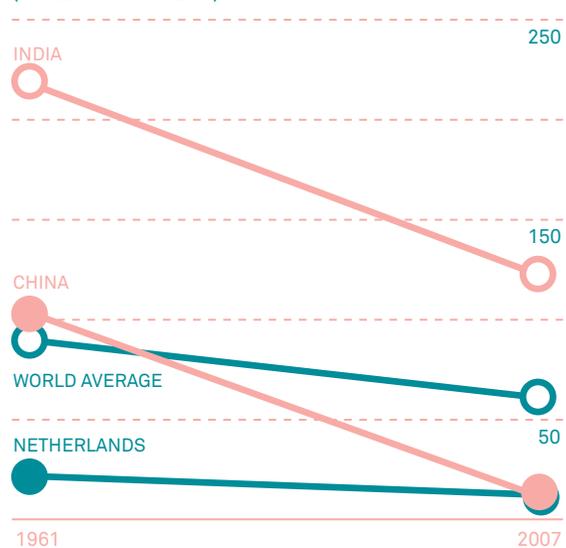
### NUMBER OF PIGS EXPORTED FROM THE NETHERLANDS (MILLIONS)



### AMOUNT OF DUTCH MAIZE HARVESTED (THOUSANDS OF TONNES)

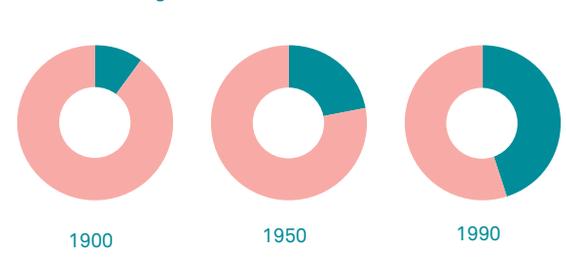


### PULSE / BEAN CONSUMPTION (KCAL / CAPITA / DAY)



### % OF WORLD'S GRAIN FED TO ANIMALS

SOURCE: *Feeding the World*, Vaclav Smil



## CALLING ALL BETA-TASTERS AND GASTRONAUTES: THIS IS YOUR OPPORTUNITY TO DIVE INTO THE FUTURE MOUTH-FIRST.

**RECIPES ARE A PERSUASIVE TECHNOLOGY.** They can transform people fundamentally. Recipes can make people desire ingredients they didn't even know existed. An ingredient, once thought of as repulsive, can be transformed into something palatable, and even delicious. A recipe can compel people to explore new places, within their own city or across the planet, searching for an obscure ingredient. Don't underestimate the power of recipes.

**RECIPES ARE A SOCIAL TECHNOLOGY.** Passed from person to person, adjusted to suit individual preferences, recipes can be tracked across cultures and through time. One year someone extols the health properties of pomegranates, and all of a sudden they are being sprinkled on salads and desserts all over the world. As a trendy, must-have ingredient, recipes that call for pomegranates increase the impetus for growing and importing these fruits. There are of course upstream decisions made from boardrooms that influence which crops are grown, but conversations in the kitchen can also be powerful selection mechanisms.<sup>1</sup>

**RECIPES ARE A SUBVERSIVE TECHNOLOGY.** Telling everyone to be a vegetarian is cultural engineering. This meme won't travel very far by itself. People don't like being told what to do. Writing and sharing a delicious menu that involves no meat products is a more generous and transformative strategy.

**RECIPES ARE A TECHNOLOGICAL ARTIFACT.** They have rules and shapes and sizes that most people are familiar with. Recipes delineate methods for acquiring, assembling, preparing and serving food. They are also meta-technologies: the rules for writing recipes can be changed.

**IN THIS BOOK YOU WILL FIND RECIPES.** Some of them are delicious, others are strange, and most of them are provocative, requiring adventurous cooks and eaters. We asked two talented and fearless chefs<sup>2</sup> to respond to our speculations on the future with something tangible. Something most people could make in their kitchen and eat. The resulting recipes are found in this book. We invite you to become a beta-taster.

1. For one critique of eaters 'voting with their forks', see the essay *Food, A Compromised Issue* by the philosopher of science Huub Dijstelboem in the book *Food for the City* by NAI publishers.

2. Heather K. Julius, Special Snowflake Studio and Scott Heimendinger, aka Seattle Food Geek.

# OUR INGREDIENTS: SEEDS, MUSHROOMS, BEANS & BLOOD

It may not be initially obvious that seeds, mushrooms, beans and blood are ingredients. Keep reading. The Center for Genomic Gastronomy will find a way to cook with anything.

**SEEDS.** Humans eat a lot of seeds, but very few Europeans save seeds anymore. Throughout history, societies have employed various strategies to preserve their agricultural genetic heritage for future generations. From informal seed swaps to a vault in the Arctic circle. Using seeds as an ingredient, we create the opportunity for home-cooks to go through the process of saving seeds and tasting them as well.

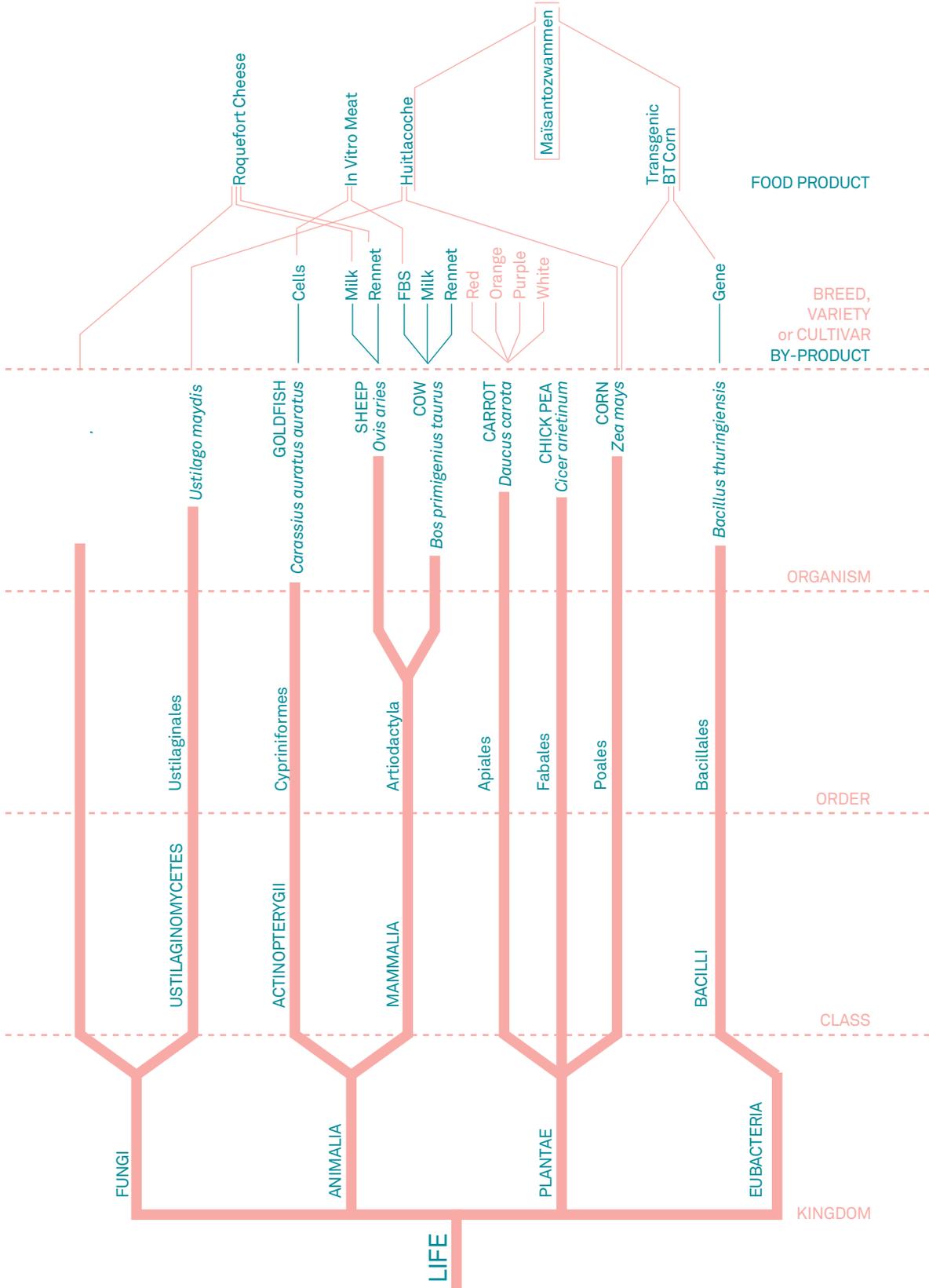
**MUSHROOMS.** If you are giving any thought to how food will change in the 21<sup>st</sup> century, it's impossible to ignore the role of maize (aka corn). It is everywhere. Starting with the Columbian Exchange<sup>1</sup> in the 1500s, corn has conquered mankind and conquered the globe. It is quite possibly the most powerful crop in the world. But we found a mushroom that can conquer corn. So we decided to cook with it: *Ustilago maydis*.

**BEANS.** Dutch people must really hate beans. Between Bartje's<sup>2</sup> hysterical outburst of "I DON'T PRAY FOR BROWN BEANS" and the rapid decline of Dutch bean consumption since the 1960s, it is time this amazing and agri-biodiverse staple of South Asian cuisine got a second chance.

**BLOOD.** Why would human blood possibly be an ingredient? Well, as a replacement for a similarly bizarre ingredient: Fetal Bovine Serum (FBS). The Netherlands is currently at the forefront of research into growing meat in the lab. However, if In-Vitro meat is going to amount to anything other than a techno-fantasy, a suitable growth medium will need to be found. Currently FBS is used, but perhaps a globally distributed network of Community Meat Labs would prefer to take advantage of a more readily available ingredient: human blood.

1. The Columbian Exchange was a dramatically widespread exchange of animals, plants, culture, human populations (including slaves), communicable disease, and ideas between the Western and Eastern Hemispheres. (wikipedia)

2. Bartje is the main character from a series of Dutch children's books written in the beginning of the 20th century. He is famous to the older generations, but seemingly unknown to people under 30.



## COMMUNITY MEAT LAB, AMSTERDAM

**MONDAY:** Joris is in his cleanroom, starting a new batch of cells. Last week he tried using a line of porcupine cells he got from Manchester, but those didn't turn out so well. This week he is sticking to the tried-and-tested goldfish cell line provided to him by his friends in the Community Meat Lab, Houston.

**WEDNESDAY:** Mrs. de Wolff is a retired nurse and a proud member of the Community Meat Lab, Amsterdam (CMLA). After her husband died she was quite lonely for a while, but now she gets a visit from a member almost every day. Today it's Sophie's turn to donate blood. Sophie loves food. Having grown up after animal-meat was outlawed in the Netherlands, she has only ever tasted lab meat. She joined the CMLA so at least she knows where her meat comes from. After the blood letting is over, they enjoy tea and cake while discussing what to bring for this week's feast.

**SUNDAY:** Everyone is gathered in Joost's living room. Sophie brought a potato salad, and Mrs. de Wolff brought a cake, but nobody will start eating before Julia brings out the meat dish.

Finally she enters from the kitchen holding a large platter of Spaghetti bolognese. "Sorry I'm running a little late. The meat was a little tricky to cook this week."

"Yeah, sorry guys. The power cuts on Friday were killing me! I had to get out the bicycle generator to make sure the cells got enough exercise!" was Joris' defense.

"Well, thankfully Julia is a marvelous cook." answers Mrs deWolff. "I'm sure it will be delicious as always." Once everyone is served and people start eating, a content silence spreads across the table, save for the banging of cutlery on plates and the sound of chewing.



# COM

# MUN

# ITY

# MEAT

# LAB

The Community Meat Lab explores how emerging food-related technologies might be applied outside of the industrial food system, allowing people to make a social and emotional investment in the production of their food rather than a monetary one.

This future scenario builds on the current DIY BIO movement to imagine a network of neighborhood groups that use scientific techniques to grow local In-Vitro meat. One of the major challenges for producing In-Vitro meat on an industrial scale is finding an effective alternative to the current growth medium: Fetal Bovine Serum. (FBS is a portion of blood plasma drawn from unborn calves). In our imagined future, decisions about what kind of animal cells to grow, and how to cook the harvested meat cells are negotiated within the group. The Amsterdam Meat Lab is connected to other Community Meat Labs around the world who share and debate the technical, ethical and culinary challenges that emerge when producing In-Vitro Meat.

**VITAL FLUIDS.** Fetal Bovine Serum is not the only unusual ingredient drawn from young domesticated animals. Rennet is a substance that is used in cheese making to coagulate milk. Traditional calf rennet is extracted from the stomach of slaughtered young, unweaned calves. Today cheese producers have many options when it comes time to choose a rennet. Rennet-type can be selected based on legal mandates (for example Roquefort is legally required to use animal-stomach-rennet), customer preference (vegetarian rennet) or budget considerations (CHY-MAX<sup>®</sup>M is “a cheese coagulant that offers lower cost-per-ton of cheese”).

If In-Vitro meat is going to be created by artisan producers, as some cheeses are now, will there be experimentation with a variety of growth media and cell types? Hypothetically, cells can come from any organism. What are the considerations for choosing the serum that is right for your Community Meat Lab? Replacing FBS with Human "serum" might be more viable for a community meat lab focused on experimentation and ethics rather than efficiency or economy.

#### HOW TO GROW IN-VITRO MEAT:

A sterile environment must be maintained through every step of this process. Make sure your lab's protocols and safety procedures are followed.

1. Take a biopsy to get stem or satellite muscle cells from an animal, such as a goldfish, frog or lamb.
2. Place the cells in a nutrient-rich medium so they can divide and multiply. Next, attach the cells to a scaffolding structure and put in a bioreactor to grow.
3. In order to achieve the texture of natural muscle, the cells must be physically stretched and flexed, electrified or exercised, regularly.
4. After several weeks, you should have a thin layer of muscle tissue that can be harvested and processed.

#### Meat Making: Cells & Serums

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##### CELLS

*Goldfish: Used since the early days of In-Vitro meat production. If you want to grow In-Vitro meat in space, Goldfish make good animal astronauts.*

*Frog: The Tissue Culture & Art Project grew *Xenopus tadpole cell line (XTC)* to create "frog steaks" for their "Disembodied Cuisine" project.*

##### SERUMS

Fetal Bovine Serum

Microbial Serum

Human Serum

*Milk Whey (not the most efficacious, but worth experimenting with.)*

#### Cheese Making: Milks & Rennets

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##### MILKS

Cow, Sheep, Goat, Water Buffalo, Elephant, Seal, Human, Yak

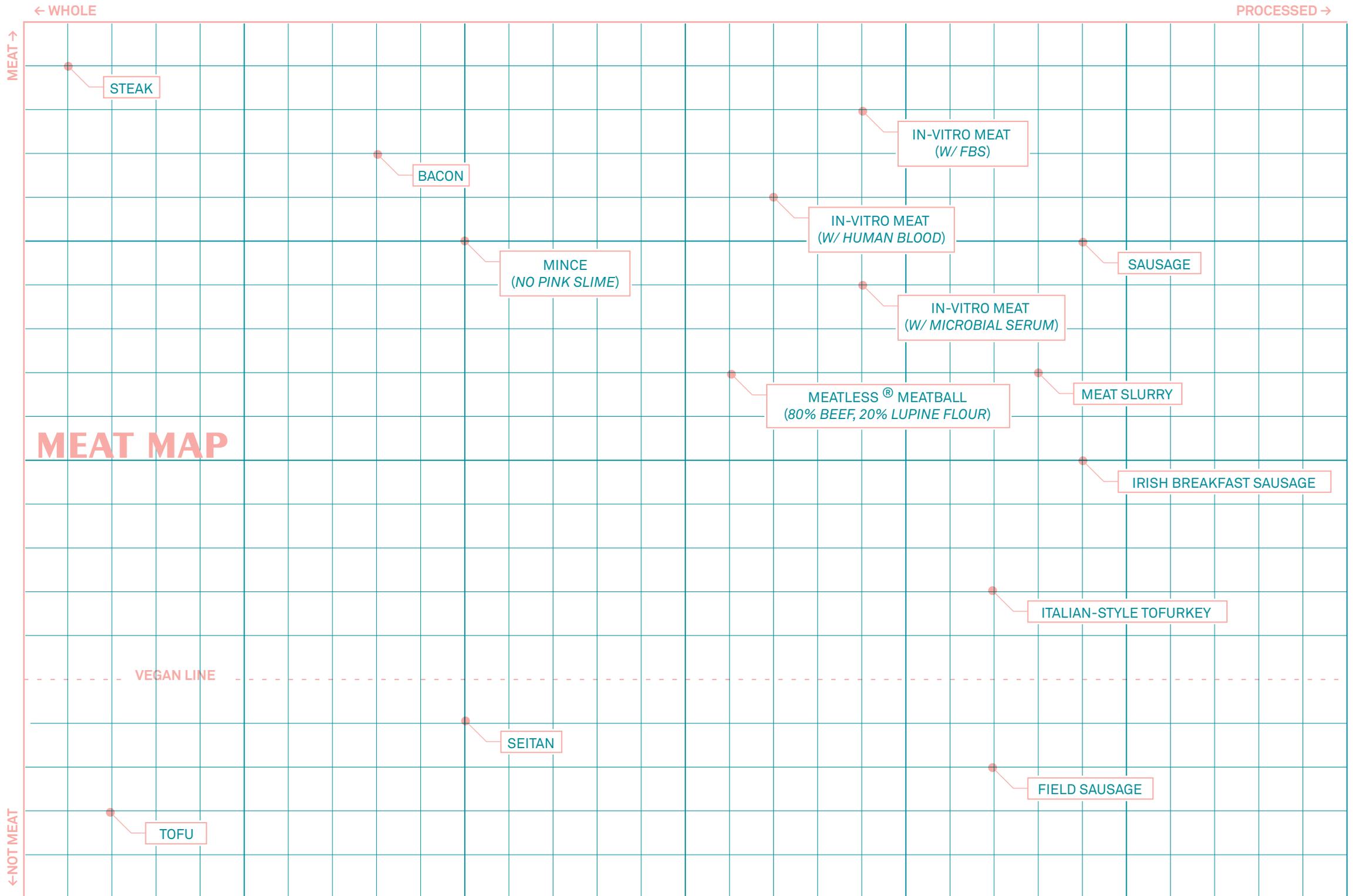
##### RENNETS

*Traditional: Calf, kid or lamb stomachs*

*Vegetable: Enzymes derived from plants, e.g. thistle*

*Microbial: from molds*

*GMO-Microbial: Cow genes inserted in bacteria, fungi or yeast to make them produce the enzyme chymosin*



# BEAN STEAK

By Scott Heimendinger, [SeattleFoodGeek.com](http://SeattleFoodGeek.com)

Simulating the complexity of steak with faux-meat or even In-Vitro meat cells is a very difficult food design challenge. It might be considered one of the holy grails of commercial food science.<sup>1</sup> In order to create a convincing fake-steak a food scientist has to take into account a range of complex and subtle flavours, textures and colours.<sup>2</sup>

Rather than growing fully developed steaks, laboratory meat is currently grown as a thin layer of cells. Advances in In-Vitro meat lab methods and culinary engineering techniques may eventually allow food scientists to produce complex concoctions of In-Vitro meat that are indistinguishable from cuts of farm-raised animals. In-Vitro meat labs like the one run by Mark Post at Maastricht University are leading the way. His lab is growing muscle and fat cells separately with the hope of then combining these tissues into a richer, steak-like concoction.

Just as traditional steak is composed of muscle and fat, this recipe for Bean Steak is composed of two kinds of beans. By extruding the beans into long strands, we simulate the texture of muscle fibers, and capture some of the visual aspects of steak. Although the flavour has a long way to go in simulating meat, this faux-steak protein could be used as a main course on any cook's meatless-Monday-menu.

1. "I am struck by how much of the Anglo-American discussion of our future prospects has really been about our right and ability to eat meat, especially beef." *Meals to Come*, Warren Belasco

2. According to research conducted by Dutch food scientist Prof. Tiny van Boekel, consumers who are not vegetarians prefer faux-meats that closely imitate the taste and performance of animal meat.

## Ingredients

260g (1 can) kidney beans, rinsed and drained

2.6g transglutaminase

10 drops Red food dye

260g (1 can) chickpeas, rinsed and drained

7.8g transglutaminase

5g gelatin powder

20g soy sauce

## Instructions

**NOTE:** Wear a mask whenever handling transglutaminase to avoid inhalation, which can cause serious injury or death.

Combine the kidney beans, 2.6g transglutaminase and food dye in a food processor and process until smooth. Reserve the kidney bean mixture.

Combine the chickpeas, 7.8g transglutaminase and gelatin powder in a food processor and process until smooth. Reserve the chickpea mixture.

To simulate fat marbling inside the steak, we will incorporate chickpea within the kidney bean mixture. Reserve 1/3 of the chickpea mixture. From the remainder, pinch off small pieces of chickpea and roll into balls about the size of a marble. Add a heaping teaspoon of kidney bean mixture to a pasta extruder or potato ricer. Top with a few balls of the chickpea mixture. Continue layering kidney bean and chickpea until you have incorporated all but the reserved 1/3 of the chickpea.

Extrude the bean mixture into long strands. With the strands aligned, press the beans into the shape of a steak.

Using an offset spatula, coat the outer edge of the bean steak with the remaining chickpea mixture.

Wrap the bean steak in plastic and refrigerate 12 hours for the transglutaminase to set.

When ready to serve, unwrap the bean steak. Brush the surfaces with soy sauce. Grill over medium heat on a nonstick grill pan or griddle.

Optionally, garnish with blue cheese and reduced balsamic vinegar.

## STEM SAUSAGE: FRANK(EN)FURTER

By Scott Heimendinger, [SeattleFoodGeek.com](http://SeattleFoodGeek.com)

Some proponents of In-Vitro meat production predict that lab grown meat will eventually replace farm-raised livestock, becoming the primary source of animal protein in the human diet. However, the first cultured meat products will not resemble the meat we buy in the grocery store today. Marketers will look for opportunities to acclimate customers to test-tube meat, sometimes also called shmeat (sheet + meat).

One way to make In-Vitro meat more palatable is to form it into sausages, since sausage meat doesn't resemble animal muscle anyway. Sausages use a wide range of spices, meat, fat and other ingredients to create diverse flavours. Presented here is an imaginary recipe and advertisement for Stem Sausage: a home sausage kit that allows you to make any type of sausage from a mixture of In-Vitro meat and seasonings.

### Ingredients

1.5 kg Bovine In-Vitro Meat Product

3g transglutaminase\*

30g salt

15g mustard powder

1g onion powder

3g Insta Cure No. 1

3g white pepper, ground

3g toasted coriander seeds, ground

15g paprika

\* For more information on emulsion-style sausages and recipes for creating these sausages with natural animal meat, see *Modernist Cuisine*. Transglutaminase is available under the Activa brand and can be found online. For this recipe, I recommend Activa RM.



### Instructions

**NOTE:** Wear a mask whenever handling transglutaminase to avoid inhalation, which can cause serious injury or death.

Combine the bovine meat and transglutaminase in a food processor bowl.

Add the salt and remaining ingredients. Process on high until the spices are evenly distributed.

Press the meat mixture into a sausage mold. Refrigerate 12 hours or until set. If you do not have a sausage mold, you can form the meat into frankfurters by hand and wrap in plastic.

Poach, steam or grill links until they reach an internal temperature of 60°C / 140°F, about 25 minutes.



C O N F I D E N T I A L SECTION 01 OF 02  
NETHERLANDS 004723

DRDONET

INDIAN DEPARTMENT FOR FOOD AND DRUGS  
FROM AMBASSADOR TEJAS GUPTA  
DRDONET

X.O. 13958: DECL: 12-108-2043

TAGS: PUBLIC-HEALTH PROTEIN NL EU

SUBJECT:

PRAY FOR BEANS (PFB) CASE, THE NETHERLANDS  
REF: A)HAAGUE 2368, B) HAAGUE 5235,  
C) HAAGUE 4710, D) HAAGUE 9810

Classified by Ambassador Tejas Gupta;  
reasons 1.3 (a), (c) and (e).

¶1. (C) Summary: Mission PFB recommends that the Indian Government reinforce our negotiating position with the Netherlands on raising bean consumption and reducing bacon rations by increasing funding of the PFB re-branding campaign with an amount of 70,000,000 Rupees. Successes so far include the introduction of chaat street vendors in major Dutch cities. Chaat has proven very popular and lucrative. Registered vendors are following regulations that mandate the inclusion of at least 20% beans per chaat served. The Gourmet Indian cooking show is also proving popular with the target demographic of 25-35 year olds. However, the large elderly population is more resistant to new recipes and further steps need to be taken to encourage the average Dutch citizen to embrace beans in their diet. I need not remind you of the importance and seriousness of this endeavor. Neglecting the issue of protein deficiency will have dire future consequences for all of Europe. End Summary.

# PR

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# ANS

Humans have a limited attention economy, and when it comes to food, the media tend to focus on hi-tech 'solutions' such as GM food and In-Vitro meat. These techno-fixes have very little to do with taste and everything to do with the perception of progress. Meanwhile beans have been neglected, both in the popular press and in our diets. Beans just aren't as mediagenic, but that is about to change.

This story imagines a future where the Netherlands, along with much of the West, has declined in both political and economic relevance. Dutch citizens can't afford to eat meat and most pigs and pork products are sent to East Asia. As a result the Dutch population is not getting enough protein in its diet.

Luckily, India has agreed to send food aid to the Netherlands in the form of dried beans and legumes of all varieties. The Dutch do not know how to eat or prepare these foods, so the Indian government supplements the food aid with a rebranding campaign for beans, which includes strategies such as an Indian cooking show.

**BEANS IN THE NETHERLANDS.** One of our scientific collaborators shared the following story in an email: *“There is a very famous Dutch book, originating from 1935, written by a woman named Anne de Vries, titled ‘Bartje’. It is situated in Drenthe, a rural and forest-rich province in the northern part of the Netherlands. Bartje is one of the sons in a very child-rich, poor family. Because the family was very poor, they ate beans very often. Even though he was always hungry, he really hated beans. Once he was so furious about the fact that he had to eat it while his mother promised him a left-over piece of yesterdays meal, that he screamed – during the prayer before dinner – ‘I don’t pray for brown beans!’. This made his father and mother furious of course, and they banned him from the house for quite some time.*

*This ‘I don’t pray for brown beans’ (in Dutch ‘Ik bid niet voor bruine bonen’ and in the Drenths dialect ‘Ik bid nie veur brûne bon’n’) has become an expression almost everyone knows. Beans are associated in the Netherlands with poverty, insignificance and failure. There are certain Dutch expressions that underline this. Beans in Dutch is ‘bonen’. ‘Honger maakt rauwe bonen zoet’ means hunger makes raw beans sweet.*

*‘Voor spek en bonen meedoen’ means: you do not count/you are nobody (in French: Compter pour le beurre). ‘In de bonen zijn’: being wrong/ entangled.”*

Perhaps Bjarte’s bean dish just wasn't prepared in a particularly appetizing way. Maybe it is time to give beans a gastronomic make-over in the Netherlands. The Dutch could learn a thing or two about cookery from India, where pulses, combined with sesame seeds and rice, play an integral role in daily cooking offering a wide variety of tasty dishes. Indian cuisine incorporates pulses, legumes and beans of all shapes and colours, through sophisticated preparations and an array of spices.

**BEANS ARE A BIOTECHNOLOGY.** Beans are a biologically constrained collection of decisions, artifacts and information, developed and maintained through human ingenuity, that do work in the world. Early agriculturalists selectively bred bean plants, and this biotechnological refinement continues to this day. Cooks developed systems for processing and mixing vegetable proteins with other ingredients to create tasty and nutritious recipes. Societies of eaters developed artifacts, customs and economies around these genomes.

Beans are a biotechnology but we don't usually think of them that way. Maybe because they are too old and obvious to spark our imagination. But DO think of them this way. Beans are a code. They need a certain platform to run: recipes, spices and societal acceptance. And their nitrogen-fixing abilities mean they are far from obsolete.



We use the terms beans, legumes and pulses interchangeably in this publication.

The technology of beans have limitations and constraints. Like many constraints, some of these may actually be "features" in disguise. Nothing worse than feature bloat in an ingredient.

**BEANS VS. BUGS.** Genomic Gastronomers are willing to cook with almost any genome or ingredient, and should embrace adventurous eating of all kinds. This includes the insect-eating fascination that seems to be sweeping through food journalism.

Whenever we mention eating insects to our collaborators, funders or audiences, ears perk up. The "Yuk-factor" works for kids, and the taboo element appeals to adults. Perfect. And then we start talking about the awesomeness of cooking with beans and everyone gets sleepy. Insects are sensational, and beans are boring.<sup>1</sup> Beans just don't have a very good reputation in the West. But we are determined to bolster the reputation of the lowly legume! (This publication marks the launch of our culinary campaign to rebrand the bean).

The more we read about the history and proposed future of eating insects the more we wonder how much of planned-Entomophagy is hope and how much is hype. Every two weeks or so since 2010 there is a new newspaper or magazine article about the merits of eating insects.

Most of these authors seem to conclude that eating insects will have a central role in the creation of sustainable food systems. The implied benefits of consuming insects primarily focus on their efficiency in generating protein and for their potential use as a substitute for other meats. Insects DO have a pretty impressive EROEI: Energy Returned On Energy Invested (especially when compared to beef).

Insects are currently eaten in many places around the world.<sup>2</sup> However, an insect-focused planned-gastronomy in Europe remains a fantasy, despite a long history. 'Why Not Eat Insects?' was a pamphlet written by Vincent Holt back in 1885, and yet, over 100 years later, the question remains.<sup>3</sup> One has to wonder what cultural impetus or culinary technology or amazing recipe will finally inspire delicious Entomophagic dishes to show up on pub menus across Europe.

If the honest concern is the need for efficient AND resilient protein sources for the human diet, why aren't nutrient-rich and nitrogen-fixing pulses getting the front cover?

Healthy ageing researchers and the Center for Genomic Gastronomy share a long term view on food and health. Using a long term view it is clear that the political ecology of the planet will radically shift in the next century. The story may no longer be about Dutch scientists creating Entomophagy programs for the "global south", but India creating Complete Protein programs for a poorer Western Europe. Now THAT might get people's attention.

1. Maybe we should dress up beans in insect clothing: a bean-bug! We proposed this idea to Seattle Food Geek and have begun experimenting with gluing beans together to make complex edible insect sculptures.

2. Marcel Dicke of Wageningen University has been trying to convince more people to embrace the culinary possibilities of insects since the 1990s.

3. For other treatises on planned-gastronomies employing fringe ingredients see *Mushroom Culture: Its Extension & Improvement* by William Robinson (1870) and *The Coming Age of Wood* by Egon Glesinger (1949).



*From a food vendor's diary,  
Amsterdam, 2036*

It's Monday and I already know how I will make my energy credits this week. I was able to acquire a crate of mostly-edible carrots on the cheap. Combined with the chili peppers my cousin smuggled, and my huge bag of chickpeas, I can finally serve my wonderful *WortelMexi-Chaat*. By filling a fried dough ball with chickpeas and carrots, farmers cheese and some chilies, you basically have a taco! Well... a taco made with the help of Indian food-aid, and cooked by a Dutch street vendor who loves carrots!

Back in the 2010s there was a Mexican restaurant over near Westerstraat. I think people who lived there then may still

remember it. I'm guessing I can charge double for a flavour that transports people's minds back to the easy days. Competition between street food sellers is getting tough. I even made a sign with a portrait of St. Kateri Tekakwitha for my customers to pray over, and maybe give a small offering to.

Even with the trashed economy and the city falling apart, location and marketing matter to the enterprising Dutch chaat wallah. Everyone needs a little taste of hope as they rush between all the little activities that fill their days. I'll ride my food-cart-trike over there on Tuesday.

I wonder if I can remember exactly which storefront that *Los Pilonos* restaurant was in?

# INFINITE (CULINARY) GAMES

## STAMPPOT CHAAT

By the Center for Genomic Gastronomy

Stamppot is a traditional Dutch dinner of mashed potatoes, vegetables and toppings. Chaat are savory snacks of fried dough, vegetables and other toppings served as street food in India. Both recipes contain a basic set of rules that allow for endless permutations. The openness of the rule sets make these dishes highly adaptive to time, place and taste.

In the future the Dutch economy might slow dramatically. Can you imagine such a possibility? If India has to send food aid to Europe in a post-oil future, dried beans would survive the long boat trips to the Netherlands. But the Dutch would have to re-learn how to cook with legumes. Luckily, with this recipe, you'll have a head start.

Stamppot Chaat draws on Indian and Dutch flavours and cuisine. Urban street vendors could easily improvise with this recipe, and find a way to incorporate all of those legumes!

Even in the impoverished European cities of 2035, street vendors would try to innovate, distinguishing themselves with novel flavours, recipes and marketing. Be on the lookout for SteamPunk StoempChaat, Nollywood Puri and WortelMexi-Chaat.

### Ingredients

#### CONTAINER

puri ball, dahi vada, dahi bhalla, papdi

#### BASE

potato, rutabaga, parsnip, carrot (boiled), celeriac, parsnips, cauliflower chickpeas, red beans, gram beans

#### VEGGIES

chopped onions, shredded carrots, leeks, spinach, green peas, cabbage, beets, kale

#### SAUCE

lemon or lime, tomato (chopped), green chutney, saunth (ginger & tamarind), sambhaal, pickle

#### CREAMY

sour cream, yoghurt, egg yolk, nut milk, nut cheese, paneer, cottage cheese, fresh cheese

#### SEASONING TOPPING

thyme, laurel, coriander, chaat masala, rock salt, basil

#### CRUNCHY TOPPING

shallot, sev, insects, moong daal (tauge), bacon, puffed rice

### Instructions

NOTE: You can leave out any ONE of the following steps, and it is probably still Stamppot Chaat. Feel free to experiment.

Choose one or more of the **BASE** ingredients and one or more of the **VEGGIE** ingredients, boil them and mash them together.

Pick one of the suggested **CONTAINER** types. Lay out six containers in a banana leaf bowl or a washable dish. (No throw-away plastic or styrofoam containers!)

Spoon some of the **VEGGIE / BASE** mixture into each of the six containers.

Pick one **SAUCE** and one **CREAMY**, and layer them on top of the **VEGGIE/BASE** mixture. It's okay if it spills over the side of the containers.

Sprinkle the top with a dash of **SEASONING TOPPINGS** and **CRUNCHY TOPPINGS** on each of the six snacks.

Make sure you have included at least one legume somewhere in your mix. If not, start again and make sure to explicitly include a legume or bean.

Serve and eat quickly! These are flavour bombs, and will get soggy if you don't slam them down.

Submit your favourite recombinatorial recipe to: [info@genomicgastronomy.com](mailto:info@genomicgastronomy.com)

## CHICKPEA, OLIVE OIL AND DUTCH COCOA CAKE

By Special Snowflake Studio

This flowerless and dairy-free dessert showcases the buttery, nut-like taste of chickpeas. The legumes, olive oil and cocoa create a superfood dessert rich in flavonoids and polyphenols and other antioxidants with proven anticancer benefits. The fiber in chickpeas also support digestive health.

If someone has never eaten or cooked with dried legumes, then this is a good gateway recipe to sneak in that experience. It may be unusual to ask a modern European home-cook to soak anything overnight, but the luxurious taste of this cake can make it a worthwhile task for even the most bean-shy chef.

### Ingredients

250 grams chickpeas\*

40 grams cocoa

3 eggs

75 ml olive ml

150 grams brown sugar

2 grams baking powder

2.5 ml vanilla

sprinkle of salt

*(omit if using canned chickpeas)*

**SUGGESTED GARNISH:** Orange or other fruit-flavoured liqueur such as Marie Brizard orange parfait, jam, powdered sugar and borage flowers.

\* it is possible to use canned chickpeas but it's optimal to soak dried chickpeas overnight in water. Discard the soaking water and then put in a pot, cover with water, and simmer till tender. Strain and cool under running water. Remove as many of the hard outer hulls as possible prior to adding to recipe.

### Instructions

Preheat the oven to 177°C / 350°F.

Lightly oil a 9-inch round cake pan (a springform pan is preferable for easy removal) and dust with cocoa.

Add all ingredients to a blender and mix until smooth. Pour batter into prepared pan and bake cake in oven 30 to 40 minutes, until the cake is still moist but has risen slightly and is firm to the touch.

Remove the cake from the oven and let cool for 5 minutes. Remove from cake pan and let cool on rack.

This cake is best the next day. After the cake is cool, store in airtight container in refrigerator overnight and then let the cake come up to room temperature before serving.

Dust the cake with powdered sugar and borage flowers for presentation; when serving, drizzle the cake slices with olive oil and fruit liqueur or syrup and place a spoonful of berry or citrus jam on each plate.



## BIOCONSCRIPTIONS

They were all standing in a row. You could almost measure the excitement in the air. For weeks, the students at the Amsterdams Lyceum had been discussing which vegetable variety they would be given to protect. The most desirable varieties could rocket an unpopular kid into super-stardom. And now the moment had finally arrived. The Delegation Ceremony. A rite of passage. A symbol of their adulthood and responsibility. They had been training for this for years. Learning a wide range of growing techniques in the school gardens. Interpreting all the available audio-visual-guides including *The Netherlands: The Switzerland of Seed Banking* and *Behandeling en Trouble-Shooting*.

Martine was nervously jumping from one foot to the other. Despite every school in the region having gathered at the town hall, her school was first and she was fourth in line. On the stage was a large wooden table, and in the center sat the large black box which contained all the packets of seeds and piles of tubers. Flashes of light kept triggering as photographers documented this historical annual event. An anticipated hush filled the room as the Mayor burst through the doors and rushed to the stage. Rambling into the microphone, as politicians often do, Martine didn't hear anything he said until he announced her name: Martine van der Burg.

She stepped up to the stage, knees trembling. She knew her parents were watching, but couldn't locate them. She was too busy staring at the Mayor's fat hand as it plunged into the black box. As it re-emerged, clutching her packet, he read into the microphone: "*Solanum lycopersicum* - Cherokee Purple variety. Believed to be a varietal bred by the Cherokee people of North America. It is a flavourful and colourful heirloom tomato." The crowd erupted in a fit of delight and envy, and Martine was blinded by the flashes as her photograph was snapped for the national news. How lucky she felt. Imagine! A purple tomato!

# BIO

# CON

# SCR

# IP

# ONS

Every thriving society develops a range of strategies for maintaining the genetic wealth and infrastructure that sustains their food system. The modern nation state has outsourced many decisions about the genetic make up of the food system to the private realm. Even where the state actively manages agricultural biodiversity and land use, these tasks are performed by specialists who are largely out of the eye of the public.

This story imagines a near-future where the Netherlands implements a national service program that requires citizens to save seeds. In this imagined narrative, civic responsibility includes preserving agricultural biodiversity and helping landraces adapt to changing climatic conditions. At present, it is not fashionable to ask what obligations a citizen has to national governments that are increasingly distrusted. All the more reason to imagine what civic responsibility in a sustainable world might look like.

## S.E.ED.S. SAVE EVERY EDIBLE SPECIES [BioConscription]

**EXECUTIVE SUMMARY:** S.E.Ed.S. is a proposed cultural policy that would mandate and fund a national genetic conservation corps. If passed into law all Dutch citizens will be required to perform national seed saving service that will contribute towards the preservation and maintenance of Civilization's agricultural biodiversity and genetic heritage.

Every citizen reaching 16 years of age will be assigned one type of seed /accession from the national seed bank which they will be responsible for maintaining during the duration of their Dutch citizenship. At least once every three years, citizens will be required to grow the plant, save the seeds, and deposit them back in the national seed bank.

Access to small plots of land will be provided for each citizen participating in the S.E.Ed.S. program. National surveys that have been conducted indicate that a majority of citizens are in favour of this policy, but only under the condition that it is phased in, such that young people are required to participate, and those who are currently adults will be exempted.

This policy has many implications for the built environment, land use, economics, immigration, education and public health.

**INTRODUCTION:** The Great Recession that has plagued the global economy since 2008 is a good opportunity for the Netherlands to assess its natural and human resources in preparation for an uncertain future. With an ageing population of 16 million humans and one of the most densely settled and managed landscapes on the planet, the Netherlands has jumped with both feet into the knowledge economy of the 21<sup>st</sup> century.

The S.E.Ed.S., program would accelerate Dutch leadership in agriculture, the life sciences, and innovative cultural policies. In addition to literacy and numeracy, it is clear that if the 'Biological Century' is to be a success, our citizens need to be well versed in the processes of living systems and the agricultural arts.

However, our increasingly urban and globalized citizens have less exposure to biological and ecological processes in-situ.

The Netherlands would continue to maintain a number of seed saving initiatives staffed by specialists, but the S.E.Ed.S. program would supplement these activities with the service of citizen-scientists.

#### PREAMBLE

1. Having ended compulsory attendance of military conscription in 1997 it is an ideal time for the Netherlands to create a non-military service program for young citizens.
2. The proposed S.E.Ed.S. program would launch a compulsory seed saving service program that begins when a citizen reaches the age of 16 and continues for the full duration of their citizenship.
3. Citizens wishing to be exempted from the S.E.Ed.S. program should fill out a conscientious objector / declared non-participation form at their local town hall.

#### REGISTRATION & INDUCTION

1. Upon their 15th birthday a citizen shall receive a letter informing them of their registration in S.E.Ed.S.
2. Letter-recipients (hereafter called "sprouts") shall have 90 days to visit the program website and select ten (10) preferred seeds / accessions from those that are currently available.
3. All accessions have a maintenance value between 1-5.
4. Although sprouts will be given no extra support for choosing a more difficult accession, they should be aware of the maintenance value and what it implies about the difficulty of their national service.

5. If the sprout does not choose any accessions, they will be assigned a randomly available accession with a maximum maintenance value of 3 out of 5.
6. Once every 6 months naming ceremonies are held at town halls. The mayor has the duty of announcing the legal name of each sprout and the accession that they have been assigned.
7. Sprouts are provided with the address of where they can pick up their accession when the growing season begins. Each inducted sprout is now formally enrolled in the S.E.Ed.S. program, and is considered to have achieved the legal status of adult.

#### FAILURE OF SERVICE

1. In the case that citizens do not submit viable seeds at the end of each 3 year period they will be required to show documentation of their agriculture efforts through photography, video and a 1,000 word explanation of their growing experience to be posted on the national S.E.Ed.S. website.

#### IMMIGRATION PROCEDURE

1. Citizens immigrating into the Netherlands will be assigned a seed of a person who has passed away in the last year, or can opt to take on a high-priority accession from the database if they choose.



“Once we figure out what seed we are assigned, do you want to get tattoos?” Sabrina asked me. She had been my best friend for 10 years and was always the adventurous one. She was so excited to register for the S.E.Ed.S. bioconscription duty that she filled out her form on the first day it came in the mail. Sabrina had picked her 5 favorite colours and found accessions in the database of available species that had that colour. A purple carrot. An olive lettuce. A crimson tomato. I was just hoping I wouldn't be assigned a stupid plant like Black Salsify!

We would know our fate by January 6th. And the citizen-service program would start one month later. The way I figured it, if I had to grow this stupid thing once every three years for the rest of my life, I might as well have a tattoo of it on my ankle so I wouldn't forget to perform my duty. At least, that was the story I was going to tell my mom. If she ever discovered the tattoo.

## ROASTED SEEDS, MINT-INFUSED GRAPE SEED OIL AND SEED MASALA

By the Center for Genomic Gastronomy

It has been said that technology is the most human thing about us. Seed saving is a one of the oldest and most resilient human technologies. Seed saving is an environmental interface between humans and the world we are constantly co-evolving with.

One of the greatest databases ever created is the collection of massively diverse food genomes that have domesticated us around the world. This collection represents generation after generation of open source biohacking by hobbyists, farmers and more recently proprietary and professionalized biohacking by agronomists and biologists.

This dish is a celebration of the great work done by countless experimenters and aesthetes whose contribution to our sculpted planet and agri-ecoculinary system is rarely acknowledged. It should remind us that “We Have Always Been BioHackers”.

*“So we gather to ourselves the genes required, whether they be in dogs, cattle grasses or other people, in order to form a miniature, artificial ecosystem, at the heart of which a city often develops.”*

- *Here On Earth*, Tim Flannery

### Ingredients

#### HOME-SAVED SEEDS

Select your own variety of seeds, from the following:

PLANTS such as tomato, squash, pumpkin, aubergine and cucumber.

NUTS such as almonds, walnuts and hazelnuts.

SPICES such as celery seed, dill seed, caraway, fennel seed and cumin.

#### SEED MASALA MIX

7 tbsp cumin seeds

10 tsp coriander seeds

5 tsp fennel seeds

5 tsp caraway seeds

4 tsp black pepper

4 tsp ginger powder

2 tsp dried mint

#### MINT-INFUSED GRAPE SEED OIL

1 bundle fresh mint

1.5 L virgin grape seed oil

### Instructions

To prepare the home-saved seeds, remove the seeds from each of the vegetables, clean and allow to dry. This can be done well in advance of serving. For more information on how to save seeds, the innumerable videos available online made by farmers and gardeners are a great place to start.

To make the seed masala spice mix, heat a pan over a medium flame. When hot, add the cumin, coriander and fennel seeds. Stir often while roasting, to prevent the seeds from burning. Roast these ingredients until they begin to turn slightly darker and to release their aromas. Having cooled all of the aromatic seeds on a plate, add the remaining masala ingredients and blend in a coffee grinder or food processor until you get a fine powder.

To make the mint-infused grape seed oil, first chop the mint. Place the oil in a pan, and add the mint. Heat until the oil just starts to bubble and let cool. Once cool, strain the oil to remove the mint pieces.

Before serving, toast the home-saved seeds in batches in a dry frying pan. Place a row of each kind of seed on the plate. Drizzle some of the infused oil on the plate and add a pinch of the seed masala spice mix you made earlier.

Serve with a pair of tweezers on the side, so eaters can pick up the smaller seeds.

# ROASTED CAULIFLOWER SOUP WITH BLACK GARLIC AND SEED SAVER GRANOLA

By Special Snowflake Studio

You can serve this dish at your next community seed library or seed swap meeting. If you are not part of one, this recipe might be just the excuse you need to locate and join a seed swapping group.

In preparing the recipe, you can teach yourself or your children how to save the seeds of pumpkin, squash or many other open-pollinating vegetables. Use a few of the seeds you save in the granola of this recipe, and use the rest as seeds for your seed library.

We can store seeds in a vault; we can also ensure that seeds will be saved by eating them and making sure that they are sown, repeated, eaten and saved again to feed people. Our culinary choices create a living loop for seed saving.

## Ingredients

### FOR GRANOLA

90 - 120 grams of assorted nuts & seeds  
(suggestions: pumpkin, sunflower,  
pine nut, sliced almond, sesame)

a pinch of cumin seeds

a pinch of coriander seeds

20 grams butter

13 grams sugar

5 grams curry powder (preferably fresh  
ground, but a spice mix from a store is  
also ok)

### FOR CAULIFLOWER

1 cauliflower, cut into small florets

1 onion, diced

1 liter duck stock (ok to substitute  
alternate meat broth or water)

4 cloves of black garlic (ok to substitute  
2 cloves of regular garlic)

olive oil

2 grams turmeric

salt and pepper to taste

## Instructions

### GRANOLA (CAN BE PREPARED AHEAD OF TIME)

Preheat the oven to 120°C / 250°F.

Cover a baking sheet with parchment paper.

Melt the butter and add sugar. After the sugar has dissolved, stir in the nuts and seeds and cook until the seeds begin to pop. Remove from heat, let cool slightly and stir in curry powder and salt to taste.

Spread the mixture on the parchment and bake in the oven until the seeds are brown and evenly toasted, about 20 minutes. Check regularly to make sure that the seeds do not burn. Remove from oven, let cool, season with salt.

Crush the nuts and seeds just prior to sprinkling on the soup.

### CAULIFLOWER SOUP

Preheat the oven to 218°C / 425°F.

Drizzle the cauliflower with olive oil and toss well to make sure that each piece is coated with a thin layer. Salt and pepper.

Roast in the oven until golden brown, about 25 to 35 minutes. Add olive oil to a pan and saute the onion, garlic and turmeric until the onion is soft. When cauliflower is ready, warm the stock or water on the stove.

In a blender or food processor, puree the roasted cauliflower and onion mix until smooth. Pour the puree into a pan and add enough stock to achieve desired consistency.

Drizzle each serving bowl with olive oil. Sprinkle Seed Saver Granola on top and serve immediately.



## TURNING FIELDS OF CORN INTO PILES OF GOLD

SINCE 2018

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### GUNTHER ROSENSPIEL

*Consultant in the highly lucrative business  
of infecting maize fields with mushrooms  
to create the delicacy Huitlacoche*

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#### TESTIMONIALS

**MATTHIJS** “I thought I was going to cash in on this Ethanol craze, but now the EU is telling me that I have to dump my crop. Something to do with fuel subsidies and overproduction, but instead I followed Gunther’s advice and infected my fields with smut. Now I’m selling to all the best boutique restaurants in the Netherlands!”

**PAUL** “Last year I was able to ship all of my corn to China for hog feed, but this year the price is less than half. I wasn’t even going to make back my investment, never mind any profit. Until I met Gunther. Now I’m making a killing!”

**[WWW.MYCOALCHEMIST.EU](http://WWW.MYCOALCHEMIST.EU)**

# MYC

Some foods rely on bio-translators such as yeast or bacteria to catalyze culinary processes that change the state of an ingredient. Bio-translators are called on to transform grains into beer and milk into yoghurt and cheese. Are there other bio-translation techniques from the history of food that can help humans transform a crop that has been overproduced into a more nutritious, tasty or profitable ingredient?

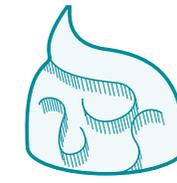
Mycoalchemy imagines a near-future where Dutch eaters, chefs and food hackers investigate the possibility using *Ustilago maydis* as a bio-translator to transform corn into an edible fungus. Commonly known in English as Corn Smut, corn infected with *Ustilago maydis* is considered a pest and substantial efforts have been made to eradicate it. However, in Mexico it is known as huitlacoche, where it appears in several dishes and can be sold for a significantly higher price than corn. Traditionally its growth was encouraged by scratching the base of the corn stalk and piling infected soil against the scratch to introduce the spores.



**GLOWING SUSHI**  
*GloFish™*  
*transgenic zebrafish*



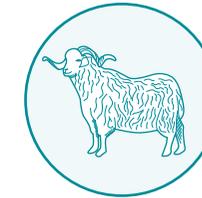
**BARREL AGED WINE**  
*Transgenic American*  
*Chestnut Tree*



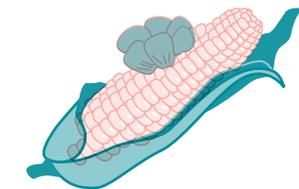
**MERINGUE**  
*Smog*



**HYPER-SWEET  
& SOUR PICKLES**  
*Cucumber B-PL-08-02/03*



**BIOSTEEL™ GOATS CHEESE**  
*Biosteel Spider Silk*  
*Goats Milk*



**MAÏSANTOSWAMEN**  
*Ustilago Maydis and*  
*Transgenic Corn*

**Q: What are unexpected ingredients?**

**A:** Unexpected ingredients are all of the possible ingredients that are not explicitly used in cooking, nor prohibited. The Center for Genomic Gastronomy uses this as a simple brainstorming technique to explore unasked culinary questions.

For example, we wondered if it was possible to use smog as an ingredient, turning the air that we breath (including a collection of air borne pollutants) into something we can eat. This is how we came up with Smog Tasting. We were also interested in the taboo of cooking with genetically modified animals, so we created the Glowing Sushi Cooking Show, using the only commercially available genetically engineered animal. Some of our unexpected ingredients are only conceptual, such as Biosteel Goat™ Cheese and Super Sweet & Sour Pickles, but maybe some day we will actually get to taste them.

Thinking through these permutations can lead to some unusual connections and strange concoctions, which is exactly the point. It is hypothesize that the discovery of rennet was made when a cow stomach was used as a pouch for carrying milk. The art of cheese making was born by tinkering with biology and getting one's hands dirty. Cheese would have been very difficult to invent using only rational, linear thinking. This is why one of the Center's mottos is: *We Have Always Been BioHackers.*

Q: Where did the idea for MycoAlchemy come from?

A: Our jury report from DA4GA (<http://www.da4ga.nl/wp-content/uploads/2011/12/DENFELD-CS-NCHA.pdf>) stated: “The lens on food culture and dietary regimes from a genetic perspective is interesting, as our food becomes more and more sophisticated and we simultaneously long for authenticity. Few restaurants serve high tech food, not even El Bulli, for they do not modify raw materials.”

Five months is not really enough time to create a novel transgenic or mutagenic organism fit for human consumption. However, we were up to the challenge of trying to modify a “raw material” by employing techniques from the life sciences in a novel way.

In the case of MycoAlchemy we began by asking how we might reduce the fungibility of an ingredient. How could we change the behavior or biological qualities of a food in order to make it irrelevant to standard market flows? We stumbled on the idea of counteracting agricultural fungibility with fungi! And there is no corn designed to be more fungible than Monsanto's patented line of transgenic corn seeds. The outcome was "Maïsantozwammen" a conceptual, unexpected ingredient, and a method for producing it. Our next step is trying to actually create Maïsantozwammen in lab conditions, and cook with it.

Q: From what you have told me, Maïsantozwammen is basically a special kind of corn smut. What is corn smut?

A: Corn smut (*Ustilago maydis*) is a pathogenic fungus that can infect and destroy fields of corn. It was consumed by the Aztecs and is still eaten in Mexico where it is called Huitlacoche. Ironically, the abnormal growths caused by *Ustilago maydis* are delicious, and are especially tasty when cooked and paired with corn.

Q: How come I have never heard of it?

A: There have been attempts to introduce *Ustilago maydis* to eaters outside of Mexico and to extend its use outside of Mexican cuisine, but like a lot of planned-gastronomy, these campaigns have not been especially successful. However, in our first month living in Amsterdam we randomly ran into huitlacoche quesadillas at a Mexican restaurant called *Los Pilonos* two blocks from our apartment. So it is not that obscure, even outside of the Americas.

During the 1980s there was an attempt in the U.S.A. to rebrand huitlacoche with invented names like *Mexican Truffle*, and it was served at high-end restaurants and special cultural events. Some entrepreneurs

attempted to grow it commercially, and the USDA conducted some preliminary investigations in how to industrially produce huitlacoche. Despite all this effort, it has never really taken off in the United States or many other corn-growing regions of the world. Rather than an ingredient requiring a different method of harvest, most farmers just treat corn smut as a blight.

Q: So is corn smut a blight or is it an ingredient?

A: In the ecology of the kitchen a pest can be in the eye of the beholder, or in the stomach of the eater.

It is interesting to note three major approaches:

1. Those that see corn smut primarily as a pest and take measures to eradicate it;
2. Those that actively try to grow and encourage corn smut;
3. Those that don't actively seek to grow corn smut but know how to harvest it if their field gets infected.

One doesn't want to romanticize pre-industrial agriculture, but there is something very inspiring and intriguing about the ability for a farmer and a society of eaters to turn a problem into an ingredient simply by changing their perspective about an organism, and then developing some recipes to make it delicious. It helps us dream about what a truly adaptive or resilient food system could look like.

Q: How does this research relate to other current food issues?

The 20th century was fueled by a dramatic rise in energy intensive agriculture. It is pretty clear that mankind's heuristics need to move beyond the obsession with efficiency and towards a model that emphasizes resilience. This might involve substituting human labor for processes that were previously carried out by energy intensive mechanization. We may want to think deeply about appropriate biotechnology and adaptive cuisines.

The cultural history of these two organisms (corn & corn smut), and the way they interact in the field and in society seem to embody the conflict between efficiency, resilience and control quite well.

And of course we are interested in the unknown and the unexpected. What does it mean to eat mushrooms grown on a proprietary species of transgenic maize? What are the legal, biological and culinary implications of this unexpected ingredient? I think we are interested in those dark corners of the food system where neither scientists or economists really want to travel to.

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C O N F I D E N T I A L SECTION 01 OF 02 PARIS 004723

SIPDIS

USTR FOR SUSAN SCHWAB  
DEPARTMENT FOR E - REUBEN JEFFERY AND EB - DAN SULLIVAN  
FROM AMBASSADOR STAPLETON

SIPDIS

E.O. 12958: DECL: 12/14/2017  
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SUBJECT: FRANCE AND THE WTO AG BIOTECH CASE

REF: A)PARIS 5364, B)PARIS 4255, C)PARIS 4170, D)PARIS 3970,  
E)PARIS 3967, F)PARIS 3853, G)PARIS 3429, H)PARIS 3399,  
I)PARIS 3429

Classified by Ambassador Craig Stapleton; reasons 1.4 (b),  
(d) and (e).

¶1. (C) Summary: Mission Paris recommends that that the USG reinforce our negotiating position with the EU on agricultural biotechnology by publishing a retaliation list when the extend "Reasonable Time Period" expires. In our view, Europe is moving backwards not forwards on this issue with France playing a leading role, along with Austria, Italy and even the Commission. In France, the "Grenelle" environment process is being implemented to circumvent science-based decisions in favor of an assessment of the "common interest." Combined with the precautionary principle, this is a precedent with implications far beyond MON-810 BT corn cultivation. Moving to retaliation will make clear that the current path has real costs to EU interests and could help strengthen European pro-biotech voices. In fact,

the pro-biotech side in France -- including within the farm union -- have told us retaliation is the only way to begin to begin to turn this issue in France. End Summary.

¶2. (C) This is not just a bilateral concern. France will play a leading role in renewed European consideration of the acceptance of agricultural biotechnology and its approach toward environmental regulation more generally. France expects to lead EU member states on this issue during the Slovene presidency beginning in January and through its own Presidency in the second half of the year. Our contacts have made clear that they will seek to expand French national policy to a EU-wide level and they believe that they are in the vanguard of European public opinion in turning back GMO's. They have noted that the member states have been unwilling to support the Commission on sanctioning Austria's illegal national ban. The GOF sees the ten year review of the Commission's authorization of MON 810 as a key opportunity and a review of the EFSA process to take into account societal preferences as another (reftels).

¶3. (C) One of the key outcomes of the "Grenelle" was the decision to suspend MON 810 cultivation in France. Just as damaging is the GOF's apparent recommitment to the "precautionary principle." Sarkozy publicly rejected a recommendation of the Attali Commission (to review France's competitiveness) to move away from this principle, which was added to the French constitution under Chirac.

¶4. (C) France's new "High Authority" on agricultural biotech is designed to roll back established science-based decision making. The recently formed authority is divided into two colleges, a scientific college and a second group including civil society and social scientists to assess the "common interest" of France. The authority's first task is to review MON 810. In the meantime, however, the draft biotech law submitted to the National Assembly and the Senate for urgent consideration, could make any biotech planting impossible in practical terms. The law would make farmers and seed companies legally liable for pollen drift and sets the stage for inordinately large cropping distances. The publication of a registry identifying cultivation of GMOs at the parcel level may be the most significant measure given the propensity for activists to destroy GMO crops in the field.

¶5. (C) Both the GOF and the Commission have suggested that their respective actions should not alarm us since they are only cultivation rather than import bans. We see the cultivation ban as a first step, at least by anti-GMO advocates, who will move next to ban or further restrict imports. (The environment minister's top aide told us that people have a right not to buy meat raised on biotech feed, even though she acknowledged there was no possible scientific basis for a feed based distinction.) Further, we should not be prepared to cede on cultivation because of our considerable planting seed business in Europe and because farmers, once they have had experience with biotech, become its staunchest supporters.

¶6. Country team Paris recommends that we calibrate a target retaliation list that causes some pain across the EU since this is a collective responsibility, but that also focuses in part on the worst culprits. The list should be measured rather than vicious and must be sustainable over the long term, since we should not expect an early victory.

¶7. (C) President Sarkozy noted in his address in Washington to the Joint Session of Congress that France and the United States are "allies but not aligned." Our cooperation with France on a range of issues should continue alongside our engagement with France and the EU on ag biotech (and the next generation of environmental related trade concerns.) We can manage both at the same time and should not let one set of priorities detract from the other.

PARIS 00004723 002 OF 002  
Stapleton

In this document, released by WikiLeaks, the US embassy in Paris responds to moves by France to ban MON 810, a genetically modified corn variety sold by Monsanto. U.S. ambassador Craig Stapleton advises Washington to start a trade war against European Union countries which oppose genetically modified (GM) crops.

The contents of this cable raise essential questions about the relationship between science, democracy and industry. Some of the key contestable terms have been underlined: *science-based decisions, precautionary principle, common interest, civil society.*

## MAÏSANTOZWAMMEN

Below are two methods<sup>1</sup> for producing Maisantozwammen, a form of corn smut grown exclusively on Monsanto products. This unexpected ingredient can be used as a substitute for any recipe that calls for mushrooms and especially recipes that use huitlacoche. As always make sure to let your *beta-tasters* know exactly what they are eating, and any risks your meals may entail.

### RECIPE 1: BT MAÏSANTOZWAMMEN

1. Purchase some genetically engineered MON 810 or MON 863 BT-corn seeds from a seed supplier and grow them.<sup>2</sup>
2. Acquire or purchase inoculate of *Ustilago maydis* from a certified science lab or scientific supplier. Some global research centers of *U. maydis* include: University of Georgia, Phillips- Universität Marburg and the University of British Columbia.
3. Inject 3 ml of *U. Maydis* inoculate down the silk channel of the maize ears.<sup>3</sup>
4. Monitor the growth of the fungus and harvest in 2 - 3 weeks.

### RECIPE 2: ROUNDUP READY MAÏSANTOZWAMMEN

1. Purchase farm animal feed from a store that has an U.S.A. source of origin, or that you think is likely to contain Roundup Ready transgenic maize (MON 809).
2. Sprout and plant the maize kernels that are found in the bag of feed.
3. Once they are growing, spray the plants with Roundup® herbicide (or generic brand glyphosate).
4. The plants that survive have resistance to roundup and are more than likely MON 809 (or are just extremely hardy Maize varieties). Next you'll need to inoculate the maize plants with *Ustilago maydis*.
5. Find a field infected with *U. maydis* and collect some soil samples underneath the infected plants which should contain spores. You may want to check with local or national agricultural agencies for reports of *U. maydis* outbreaks in order to locate appropriate fields.
6. Scratch the base of the corn stalk and pile the spore-infested soil that you collected, against the scratch.
7. After 2 - 3 weeks, when galls are enlarged, harvest the Maisantozwammen and store until you are ready to cook and eat it.

1.  
The first method is more precise, but more expensive. The second takes much more time, but may be the only possibility, depending on your locale. Plus, we think that contestational cooks will want to get their hands dirty, creating this MycoAlchemical ingredient from scratch.

2.  
Make sure to follow all of the appropriate isolation distance requirements that apply in your geography.

3.  
Silk channel inoculations can be done with devices such as a hypodermic syringe, a hog vaccinator, or a backpack sprayer equipped with a stainless steel needle.

## QUINOA, AMARANTH AND HUITLACOCHÉ CROQUETTES

By Special Snowflake Studio

Huitlacoche (aka corn smut, Mexican truffle, “*excrement of the gods*”) is a black fungus that grows on corn. Honestly, it looks like a black brain. But it tastes like smoked corn that has been infused with vanilla and the earthy flavour of mushroom. While some key nutrients in corn are not bioavailable (such as niacin that is only released through soaking in an alkali such as ash or calcium carbonate), huitlacoche feeds on an ear of corn and creates new and nutritious compounds such as lysine (that is missing from corn) that makes for a nutritional complement to corn.

By eating huitlacoche and corn together, the lysine from corn smut combines with amino acids in corn to form a complete protein just like meat. You could call this an example of a plant-based “meat” lab.

This recipe also includes other grains that are complete proteins: quinoa and amaranth, both superfoods that have an ancient cultivation history.

### Ingredients

170 grams cooked and cooled quinoa

85 grams cooked and cooled amaranth

215 grams canned, fresh or frozen huitlacoche

3 eggs

1 onion, chopped

30 grams bread crumbs

30 grams ground cornmeal

salt and pepper to taste

olive oil

### Instructions

Chop the huitlacoche and combine with the quinoa, amaranth, and eggs.

Add a dash of salt and pepper. Mix thoroughly.

Add the onion, bread crumbs, and just enough cornmeal to help the mixture become firm but still moist.

Shape the mix into patties or balls to fry in the pan.

Add a thin layer of olive oil to a pan and turn the heat up to medium. When the pan is warm, add the patties or balls and cover the pan.

Cook for about 6 minutes on each side so the outside is brown and the inside is warm and fluffy.

Serve with your favorite dipping sauce.

## UPPING THE ANTIOXIDANTS: TWO DISHES FOR HEALTHY AGEING

In preparing recipes in collaboration with the Center for Genomic Gastronomy for their project with the Netherlands Consortium for Healthy Ageing, I looked at disease and mortality rates in the Netherlands. Unlike the U.S. which has high incidence of cardiovascular disease, the Netherlands instead has high cancer rates. To promote health and vitality, an ageing population in the Netherlands could benefit from eating more foods with antioxidants and foods that are undergoing trials to establish their cancer prevention and cancer-fighting capabilities.

The Dutch government has also expressed concern about intensive animal farming operations in the Netherlands and is trying to decrease antibiotic usage by farmers. It's an unfortunate fact that while the Netherlands has one of the lowest levels of human antibiotics use, it holds Europe's highest rank for antibiotic administration to animals.

This prompted my recipes for this cookbook to have an emphasis on plant-based sources of protein, including beans and grains, including chickpeas, quinoa and amaranth.

- Heather K. Julius, *Special Snowflake Studio*

## BEET AND BLUEBERRY CRUMBLE

*By Special Snowflake Studio*

### Ingredients

1 small to medium-sized beet  
0.5 kg of blueberries and assorted fruit,  
such as rhubarb, apple or pear  
grated ginger  
ground ginger powder  
113 grams cold butter, cut into small cubes  
52 grams oats  
65 grams flour  
108 grams white sugar  
grated nutmeg  
basil leaves taken from 2 sprigs  
lemon  
salt, pepper

**SUGGESTED GARNISH:** sour cream  
or yogurt, slivers of candied ginger and  
basil sugar

It's possible to select ingredients that can make dessert a health-enhancing opportunity. The purple pigments in blueberries and beets contain anthocyanins which are powerful antioxidants. Ginger has hypothesized anti-tumor effects on cells, including colorectal and ovarian cancer. Some additional fiber from oats and a garnish with cultured dairy such as sour cream or yogurt for calcium and probiotics increases the nutritional benefits of this dish.

### Instructions

Preheat the oven to 190°C / 375°F.

Place the blueberries in a bowl (avoid aluminum).

Dice the beet into small cubes and dice the remaining fruit in larger chunks. Combine all diced fruit in the bowl with the blueberries and beet, grate a 3 cm piece of ginger and add. Squeeze the juice of 1 lemon over everything, toss, and set the bowl aside.

Prepare the crumble: combine the basil and sugar in a blender and process until the individual leaves disappear and the sugar becomes green. Add more basil as necessary according to taste. Reserve a small amount of the sugar to sprinkle over the finished crumble.

Combine the sugar/basil mixture, butter, flour, nutmeg and a sprinkle of salt and pepper in a mixer to create a pebbly mixture (This process can also be done by hand, with a fork or with a masher, but work quickly and try to keep the butter cool). Stir in the oats.

Spread the fruit in a flat baking dish and sprinkle the crumble over the top.

Bake for 30-45 minutes until the fruit bubbles and the top is brown.

# GREEN TEA KERCHIEF PASTA WITH TENDER BOILED EGG & BROWN BUTTER SAUCE

By Special Snowflake Studio

## Ingredients

### PASTA

150 grams flour (you can experiment with different types, I used a very fine grain "00" soft white wheat flour)

2 farm eggs

3 grams matcha or sencha green tea powder

### TENDER BOILED EGG AND BROWN BUTTER SAUCE

1 egg (per person)

14 grams butter (per person)

1 lemon to squeeze over everything

### SUGGESTED GARNISHES

kale, grated parmesan cheese and chive flower.

## Instructions

### GREEN TEA PASTA

Crack the eggs in a bowl and beat lightly with a fork. Sprinkle green tea into the eggs.

Mound the flour and create a well. Pour the eggs and green tea mixture into the well and cover with flour.

Push some of the flour to the side in order to use the minimum amount of flour to achieve a cohesive dough. Use just enough to create a moist, pliable dough. Knead steadily for 8 minutes.

Place the dough in a bowl. Cover the dough with a cloth and a plate over the bowl to keep it moist. Let rest at room temperature for 30 minutes to 2 hours.

Roll out the pasta with a pin or wooden dowel. Focus on pushing the pasta outwards instead of pressing down. Use your hands to also stretch the dough to achieve an elastic, elongated shape. Stop when you are satisfied with the size and thickness. Work quickly to avoid drying out the dough.

Use a ruler to figure out your pasta dimensions and cut evenly-sized pasta squares. Separate the squares with parchment (or plastic if you must) and set aside.

Fill a pot with water and salt generously so that it tastes like the ocean. The salt helps to prevent the pasta squares from sticking to each other during cooking. Bring to a boil and add squares, cook only until al dente (cooked but still firm) and then remove, drain and run cold water over the pasta to halt cooking.

Place pasta on plates or set aside to prepare sauce and accompaniments.

## Chef's Notes

This is an inventive way to add some antioxidants to a meal with green tea pasta.

Fresh egg pasta is very easy to make at home: rolling out thin layers of pasta dough does take practice to achieve thin sheets. Even early imperfect efforts are delicious, and this is a recipe that is healthful and worth repeating regularly.

The basic recipe makes about 6-10 pasta "kerchiefs" depending on the size of the squares. It's easy to scale up from this by keeping the ratio of about 150 grams flour to 2 eggs and 3 grams of green tea.

Many cooks write with painstaking precision about rolling out pasta; Marcella Hazan in "Marcella Cucina" does an exemplary job of this. I took a more casual approach but please do consult other guides to achieve pasta perfection.

### TENDER BOILED EGG AND BROWN BUTTER SAUCE

Bring a pot of water to a boil. Fill another bowl with cold water. Select the number of eggs that you wish to boil.

When the water comes to a boil, use a ladle to cushion the eggs against the side of the pot while lowering gently into the pot. Set a timer for 6 minutes and remove eggs from pot and gently lower eggs into bowl of cold water.

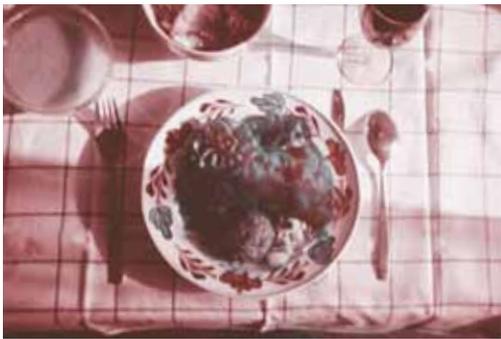
Replenish cold water or add ice as needed to keep the water cold. When the eggs are cool, remove and set aside.

Add the butter to a pan and bring to a simmer over medium heat while the milk fats rise, foam and brown. Cook just long enough to brown the milk solids, do not burn.

Peel the tender boiled eggs.

Drop a pasta kerchief for each person on a plate or serving platter. Arrange any suggested garnishes (kale, grated parmesan cheese, chive flower) on the plate.

Slice an egg in half and place on pasta square, let the yolk provide a rich sauce for the pasta. Drizzle brown butter over the egg and pasta. Squeeze lemon and add salt and pepper to taste.



Some of the participants of the *Growing Old Together* study agreed to keep a food diary for one week, taking a photo of every meal. This is a small selection of what they ate.

## ABOUT THE CENTER FOR GENOMIC GASTRONOMY

The Center for Genomic Gastronomy is an independent research institute engaged in exploring, examining and understanding the genomes and biotechnologies that make up the human food systems of planet earth. We are dedicated to the advancement of knowledge at the intersection of food, culture, ecology and technology. The Center presents its research through public lectures, research publications, meals and exhibitions.

Since beginning our work in 2010 we have conducted research in India, Spain, Ireland, Germany, the Netherlands and the U.S.A. The Center has collaborated with individuals in each of these countries who have contributed research, recipes and essays.

*[www.genomicgastronomy.com](http://www.genomicgastronomy.com)*

## CREDITS

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*Roasted Cauliflower Soup with  
Black Garlic and Seed Saver  
Granola*

*Chickpea, Olive Oil And Dutch  
Cocoa Cake*

*Quinoa, Amaranth and  
Huitlacoche Croquettes*

*Beet and Blueberry Crumble*

*Green Tea Kerchief Pasta with  
Tender Boiled Egg and Brown  
Butter Sauce*

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**Scott Heimendinger,**  
[www.SeattleFoodGeek.com](http://www.SeattleFoodGeek.com)

*Bean Steak*

*Stem Sausage: Frank(EN)furter  
(including DIY sausage kit poster)*

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Mr and Mrs Van der Burg

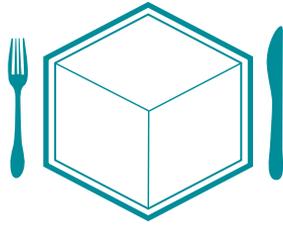
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## ABOUT DA4GA

The Designers & Artists 4 Genomics Award highlights and explores the exciting and novel possibilities between design, artistic practice and life sciences. Conceived by the Netherlands Genomics Initiative, the Centre for Society and Genomics, and Waag Society, the Designers & Artists 4 Genomics Award aims to stimulate emerging designers and artists to delve into the world of bio-art, and produce new work in close collaboration with the Netherlands most prestigious Genomics Centres, for example in the fields of sustainability, food, health, bio-informatics, agriculture, and safety.





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