14:05-14:25

Foodomics 2.0

Wim Van Criekinge

Ghent University

SCIENCE • FOOD • SOCIETY

Parma - Italy, 18-21 September 2018

^[now][transl|comput]ational[epi]genomic$

^[now][transl|comput]ational[epi]genomic$

deVGen

VUmc VU University Medical Center Amsterdam

BETA MADE WITH Drupal

BioBix

Lab for Bioinformatics and computational genomics

30 "genome hackers"
mostly engineers (statistics)

MDxHealth

NETHERLANDS CANCER INSTITUTE ANTONI VAN LEEUWENHOEK

GenOhm
lab.informatics.simplified.

YES WE TIMELAB

Reagent

nxtgnt

scientists, technicians, geneticists, clinicians

Centre for Synthetic Biology

dewpal/aerolis

NXT-DX

BISC Global

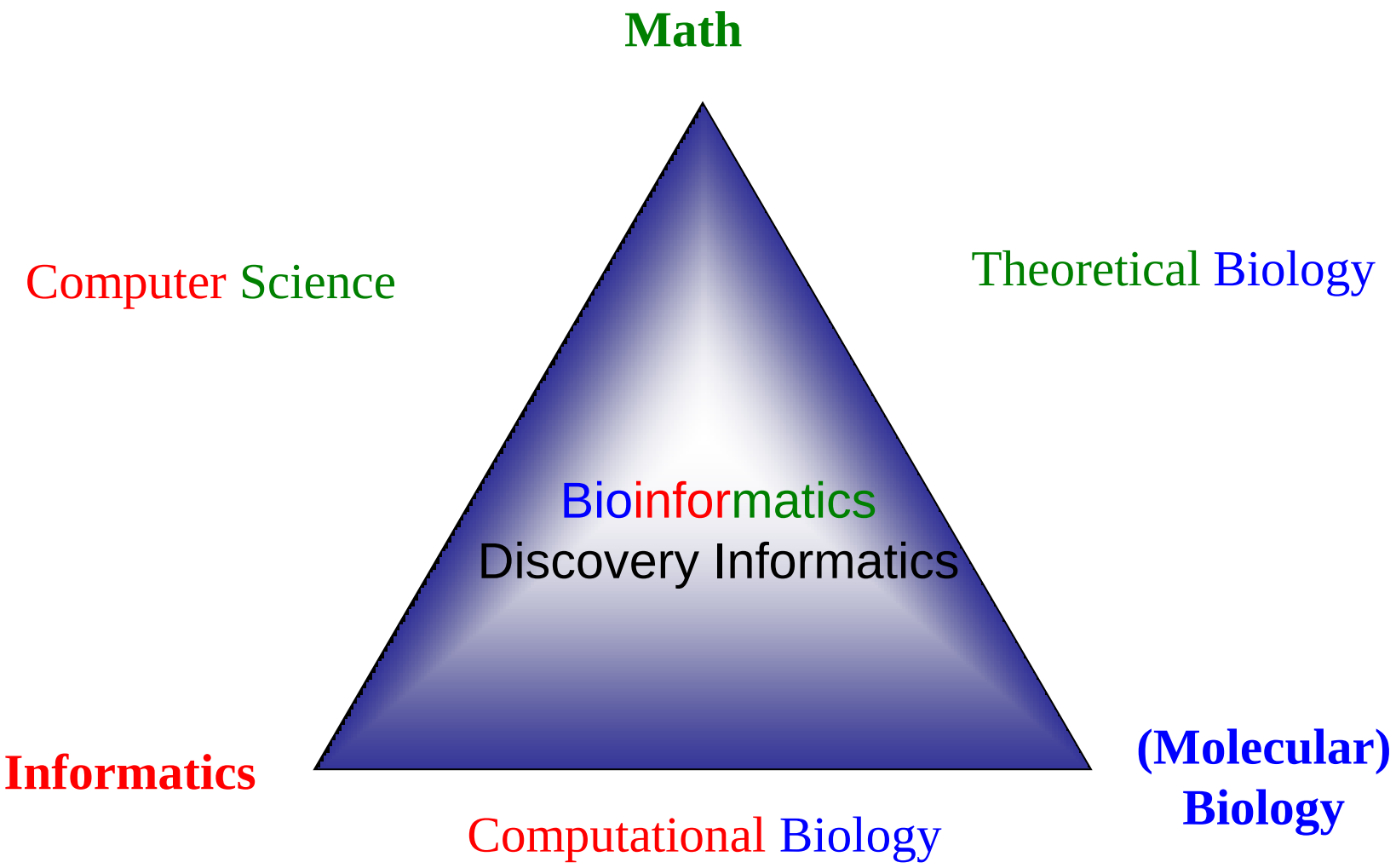
Wobblebase

N2N

>100 people
Hardware/software engineers, mathematicians, molecular biologists

Novalis

^[now][transl|comput]ational[epi]genomic$



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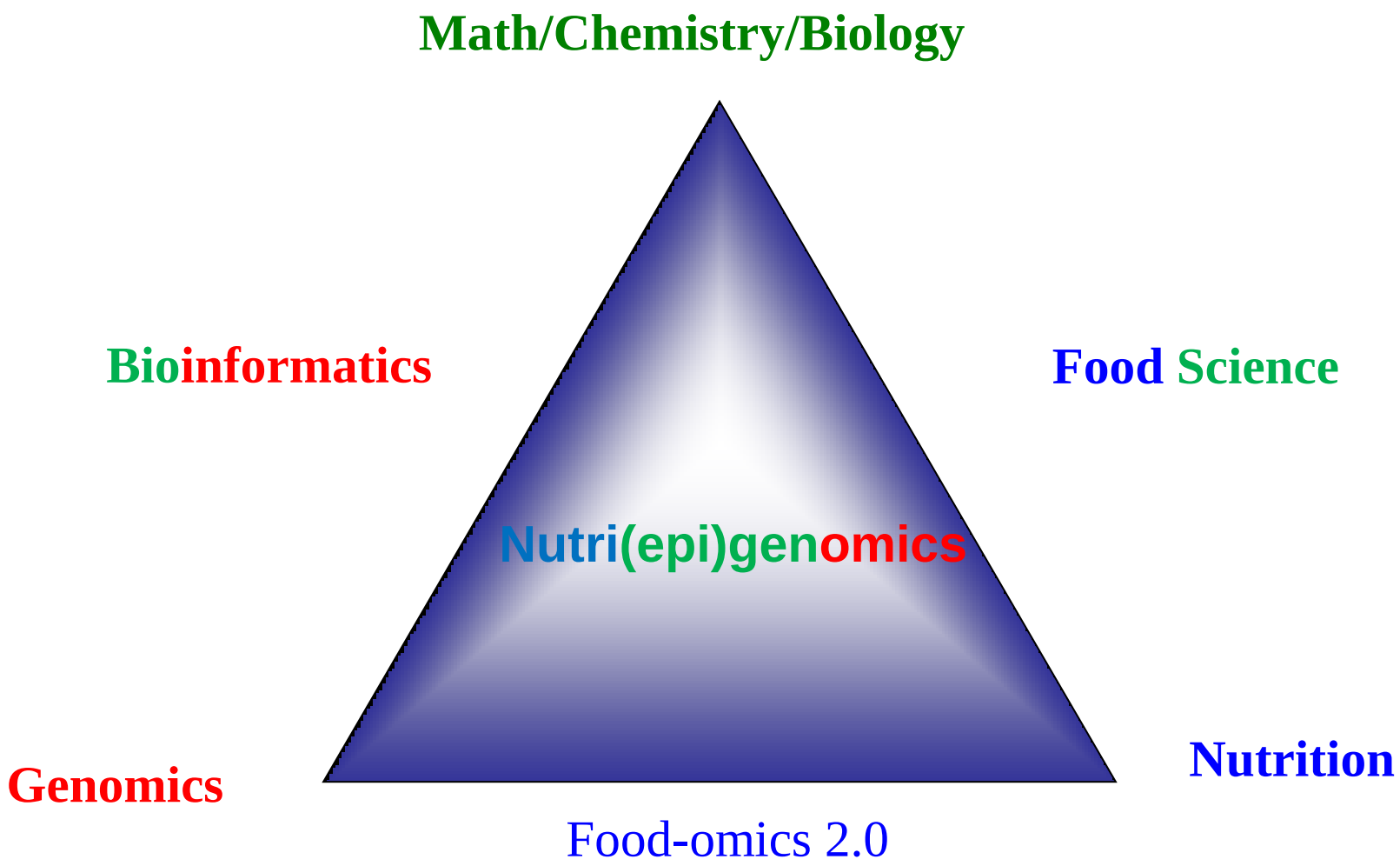
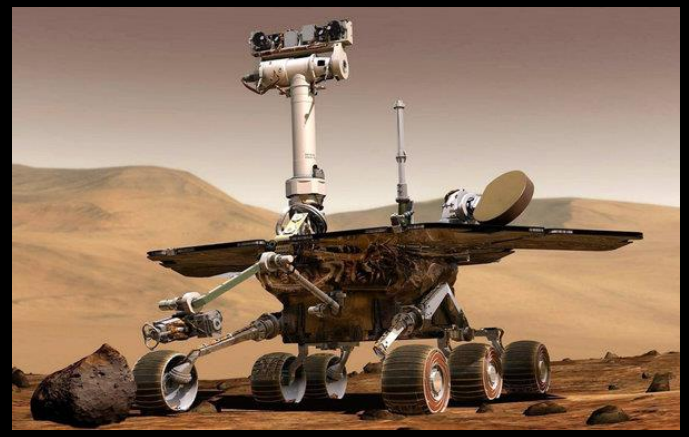


"*a discipline that studies the Food and Nutrition domains through the application and integration of advanced -omics technologies to improve consumer's well-being, health, and knowledge*".

"The future is already here,…
it's just not evenly distributed."

William Gibson, Futurist |Cyber-Visionary



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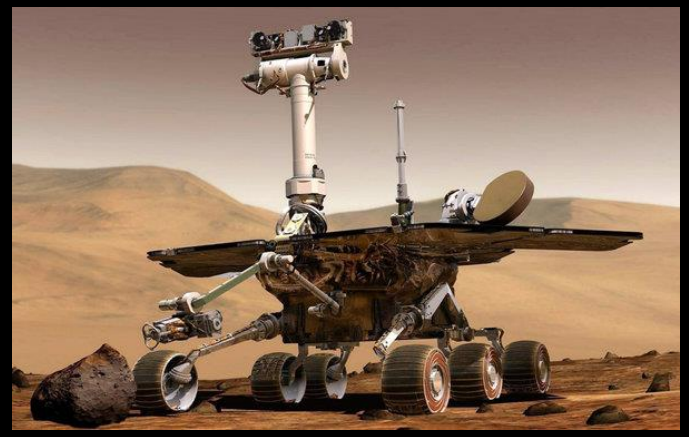

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Foodomics 2.0

- Genetics
  - Nutrigenomics
  - Examples
- Epigenetics
  - Nutri-epigenetics
  - Examples
- Metagenomics
  - Nutri-metagenomics
  - Examples
- Foodomics 3.0
  - Technology
  - Big Data / AI

5 years ago …

ROME

Maker Faire®

THE EUROPEAN EDITION

BE A MAKER HOW TO PARTICIPATE CHE TH

Home / Makers C4M / Personalized Proteins

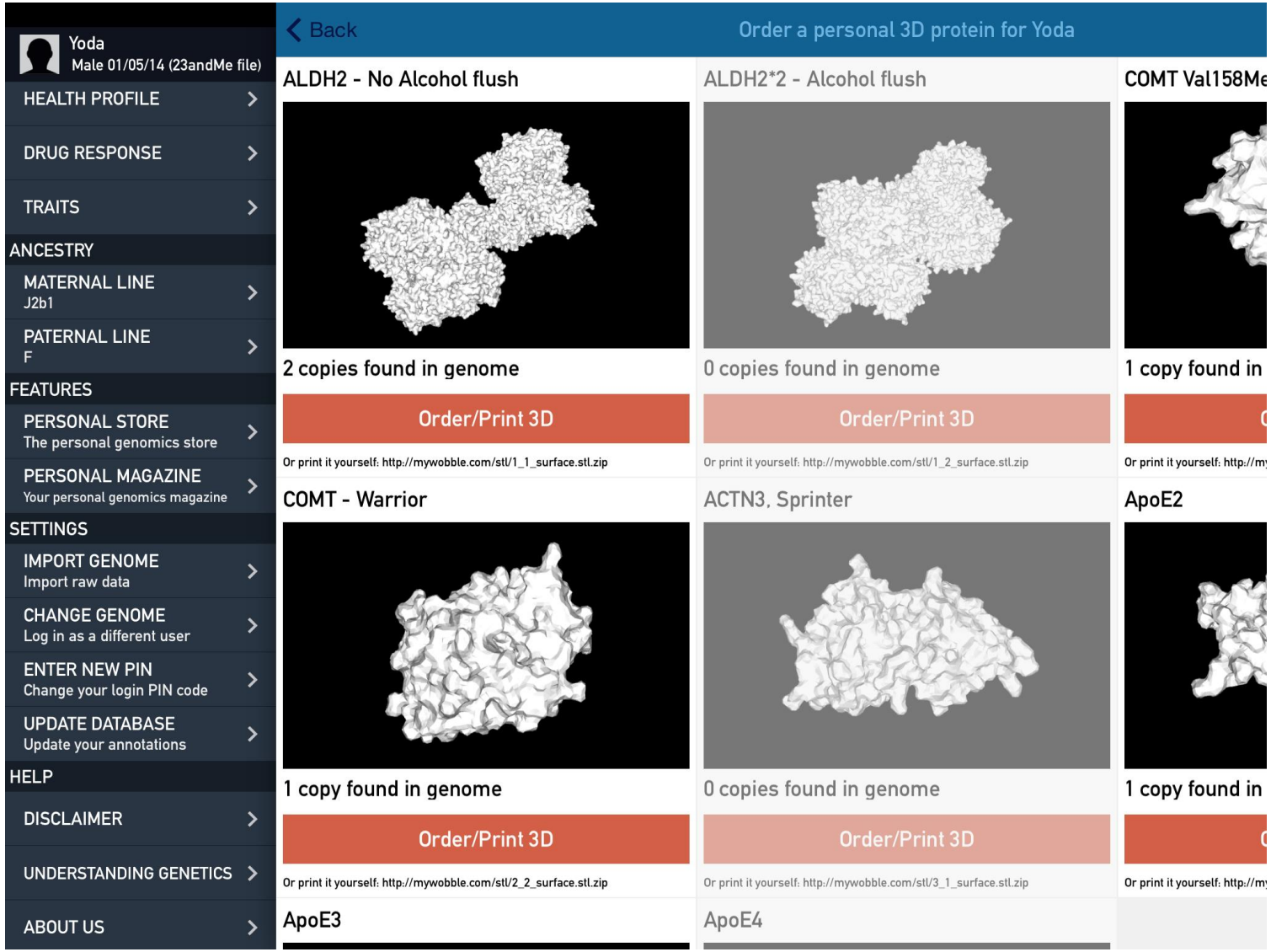
Personalized Proteins

Wobblebase develops apps that allow the user to manage and explore his or her own genome. The apps aid in the interpretation of those variations /mutations with the highest probability of having a phenotype. In order to make this more tangible we allow the user to 3D print his own protein sets.

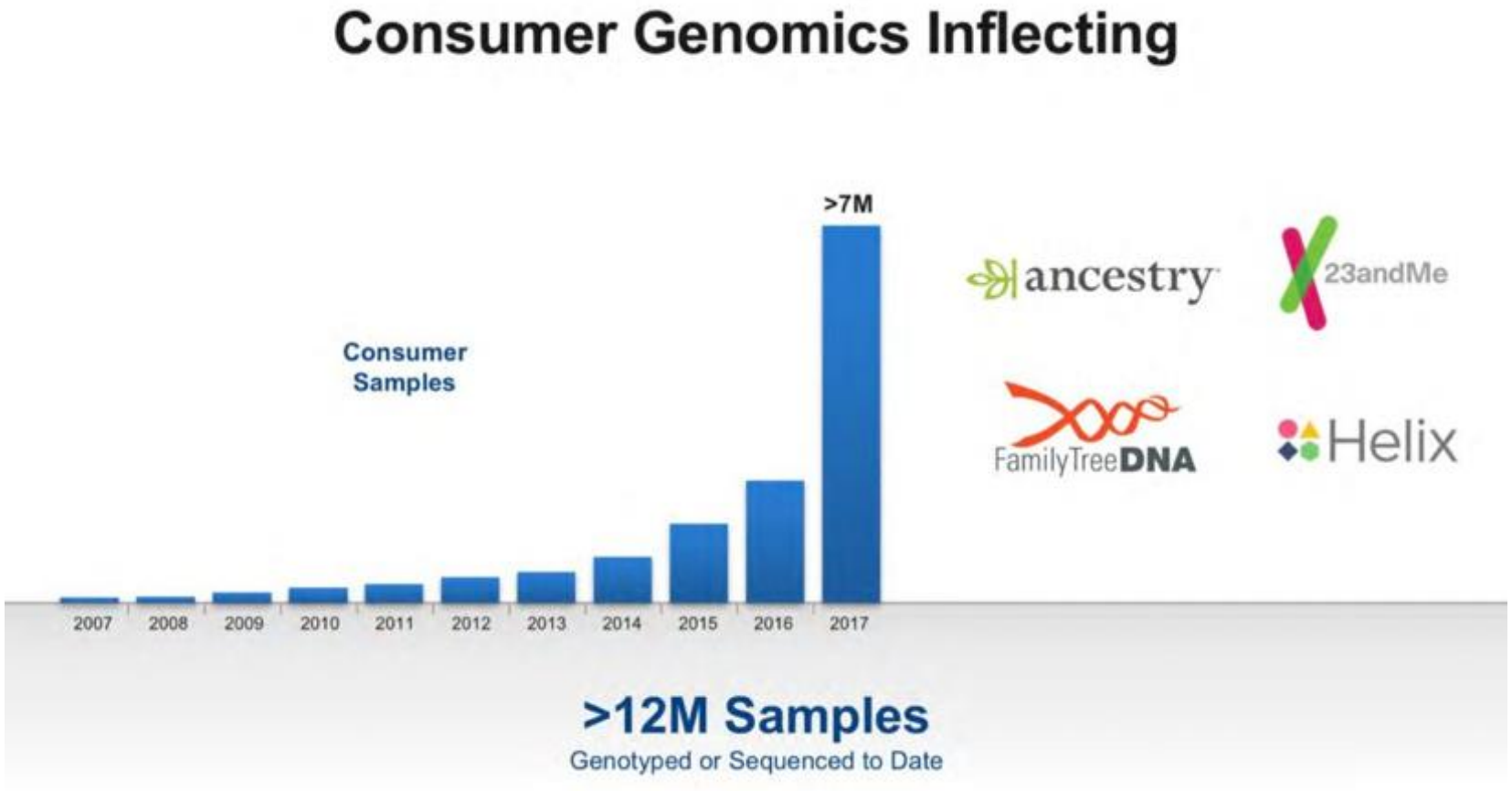
Team

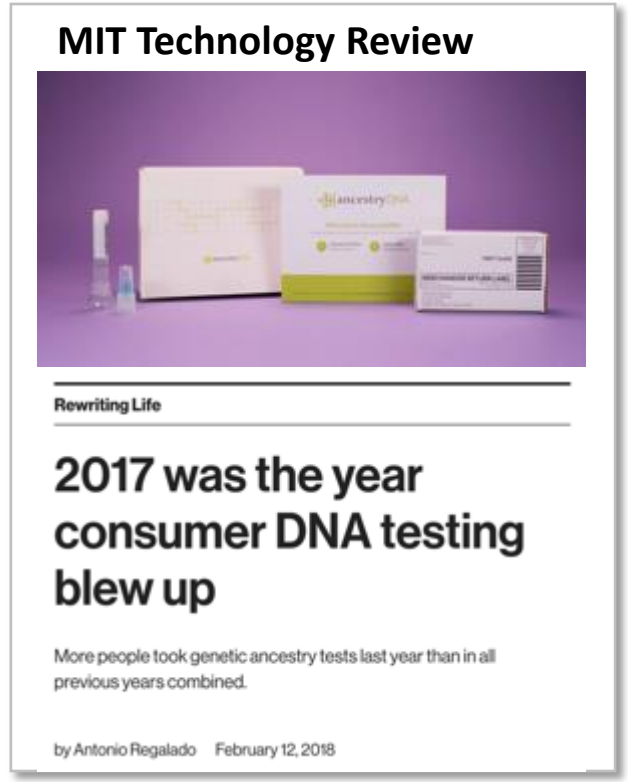
Personalized Proteins
Geert Trooskens, ?Bioinformatician and app developer
Peter Schotte, Senior scientist with biotech experience
Wim Van Criekinge, Bioinformatician and entrepreneur

- Website



Consumer Genomics Market Expanding Rapidly





Source: 1) https://www.technologyreview.com/s/610233/2017-was-the-year-consumer-dna-testing-blew-up/; 2) Illumina @ JP Morgan Healthcare 2018

What can Consumer Genetic Testing Offer?

Applied & Translational Genomics 8 (2016) 16–22

Contents lists available at ScienceDirect

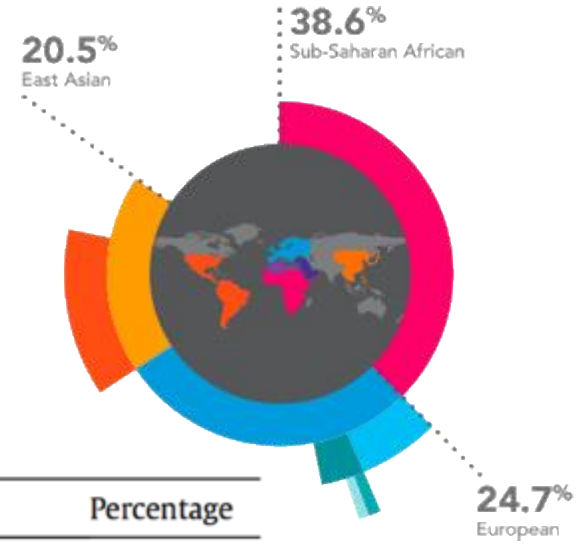
Applied & Translational Genomics

journal homepage: www.elsevier.com/locate/atg

'Only a click away — DTC genetics for ancestry, health, love…and more: A view of the business and regulatory landscape'

Andelka M. Phillips

DPhil Candidate, Faculty of Law, University of Oxford, United Kingdom



Categories of tests offered by DTC companies.

Category	Number of companies	Percentage
Ancestry	74	30%
Athletic	38	15%
Child talent	4	2%
Matchmaking	3	1%
Surreptitious	34	14%
Nutrigenetic	74	30%
Non-legal paternity	88	36%
Legal paternity	83	34%
Genetic relatedness	92	37%
Carrier	27	11%
Only health testing	31	13%
Total companies analyzed	246	

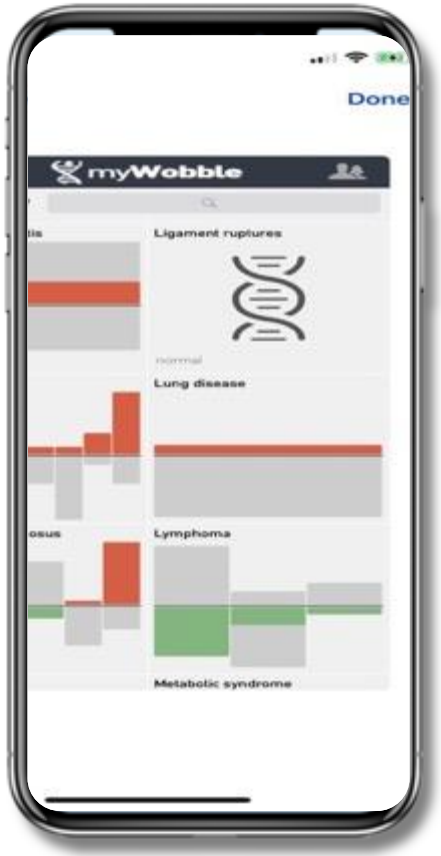
Source: https://www.sciencedirect.com/science/article/pii/S2212066116300011

Wobblebase's mission is to bridge the gap between consumers and medical professionals to leverage genetic information to its fullest potential.

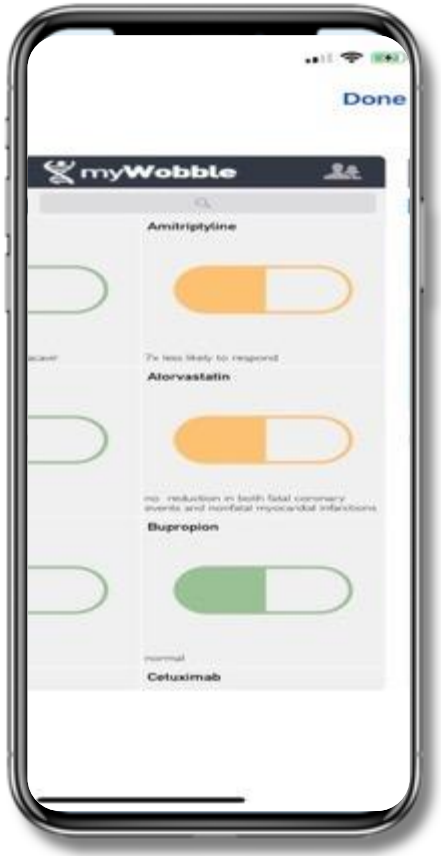
All-in-One Interface

Genetic Traits

Health Risk



Pharmacogenetics



Genealogy

myWobble, GeneWall

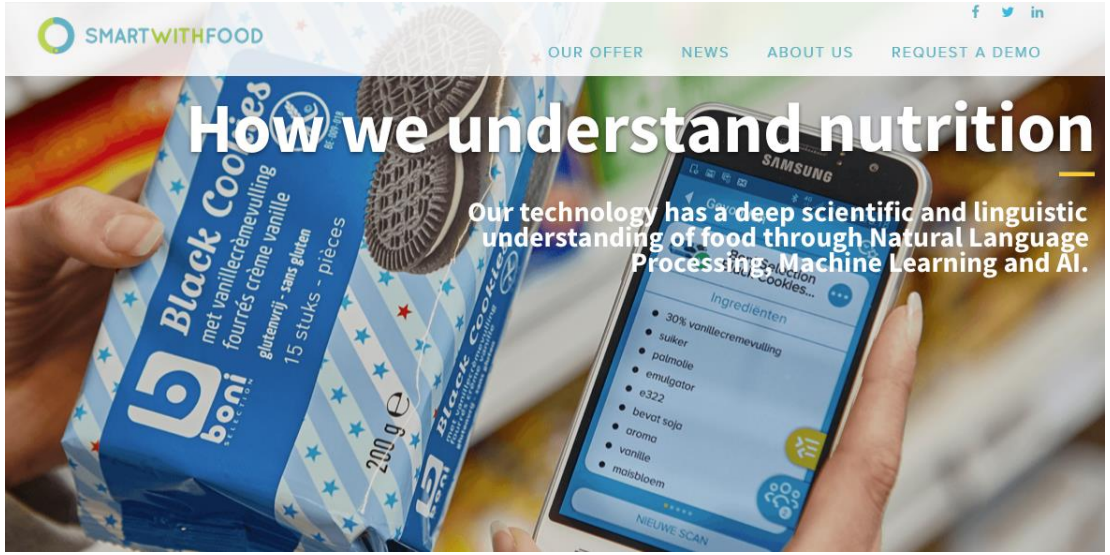
Use camera to identify Pill

Get “Insert” from database

Get pharmacogenomics SNPs

Check your SNPs

AR / Report



Use barcode to identify product

Get ingredients

Check your SNPs against ingredients

- Sensitivities
  - eg peanut
  - allergens
- Metabolic compatibility

AR / Report

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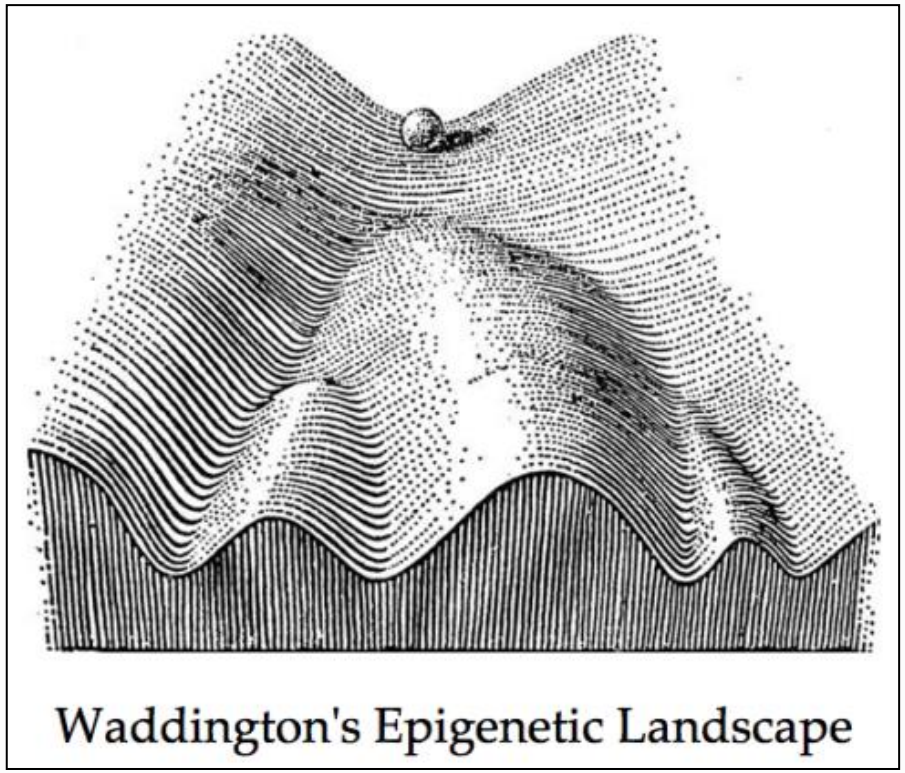
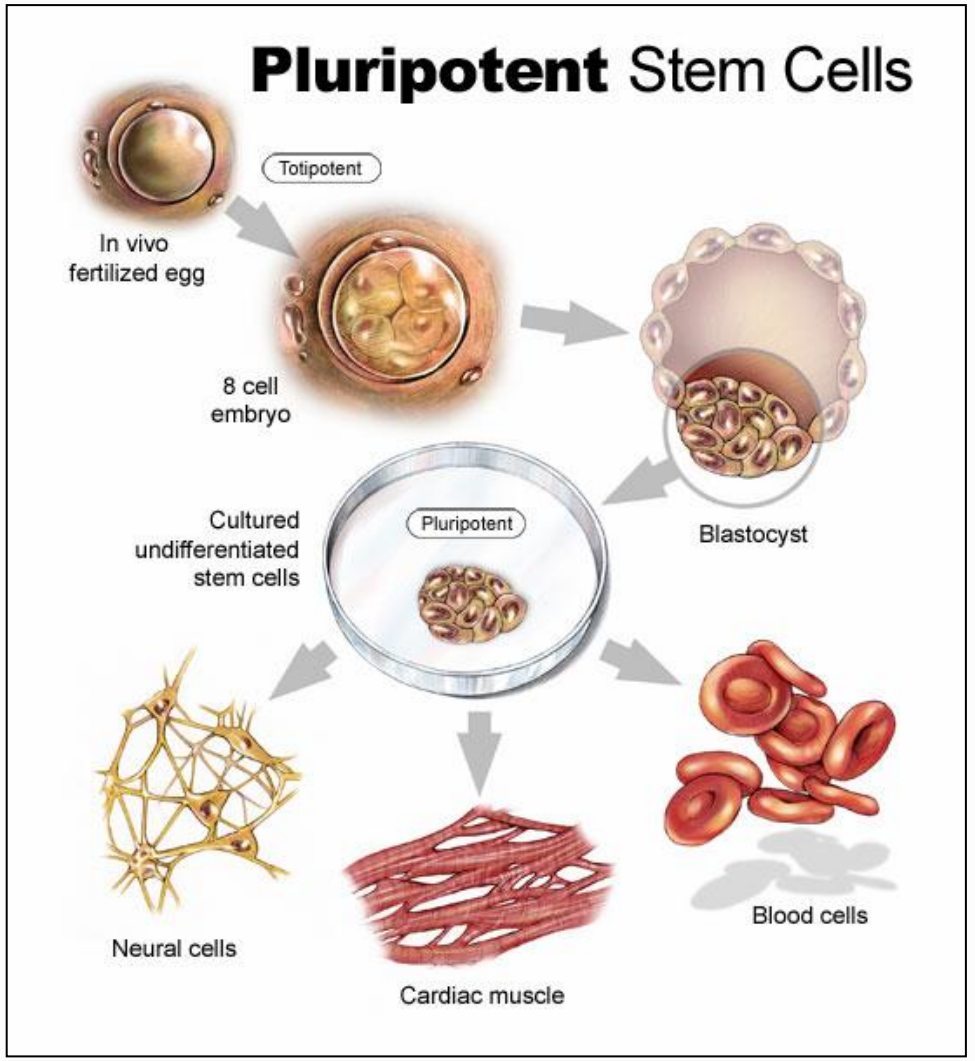
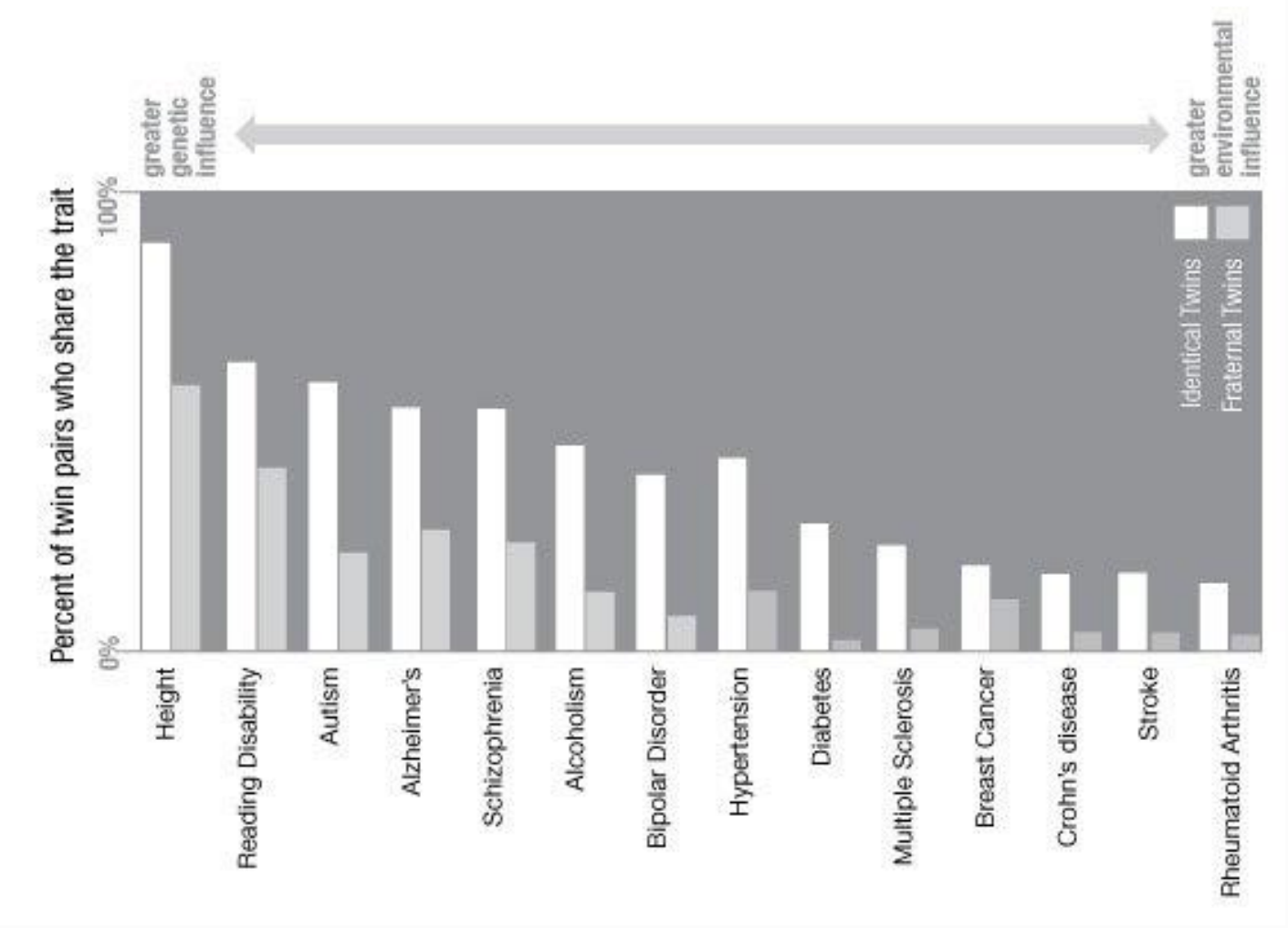
Relative importance of (Epi)genetics (i)





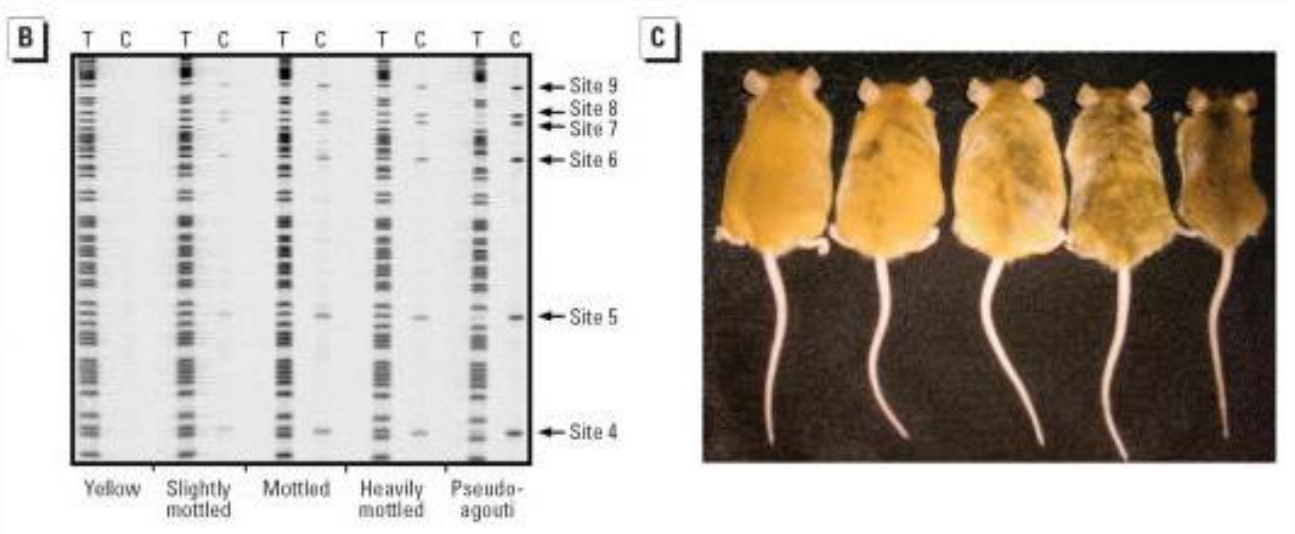
Relative importance of (Epi)genetics (ii)

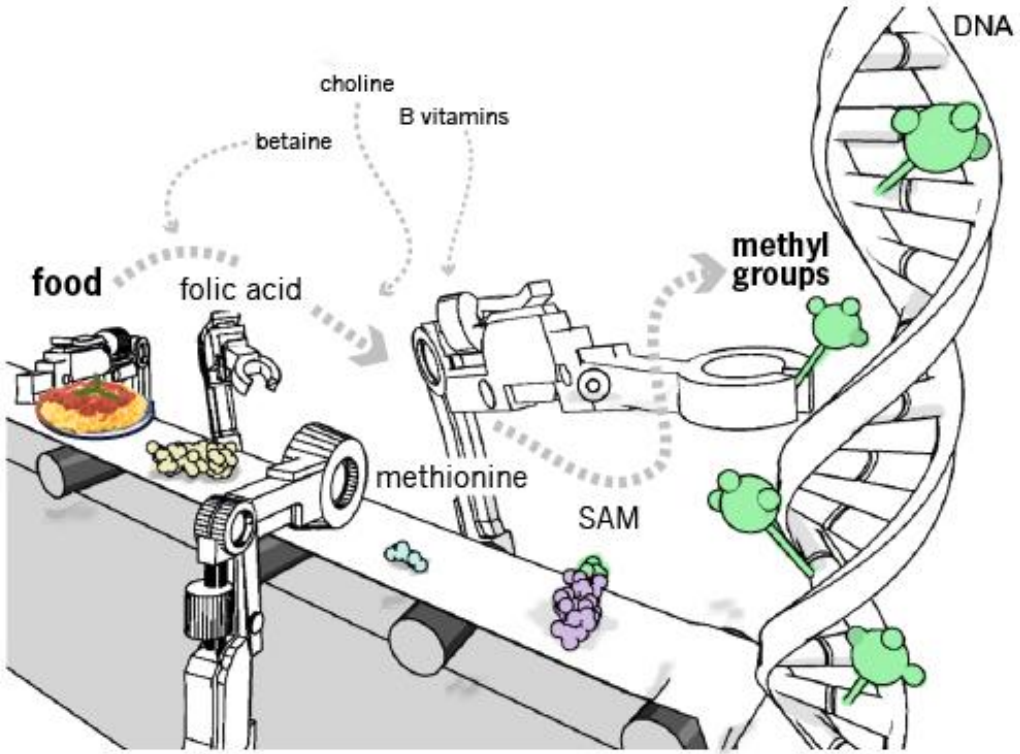
- Epigenetics enables to reuse one genome for many different purposes
- Epigenetics driving etiology of many human diseases

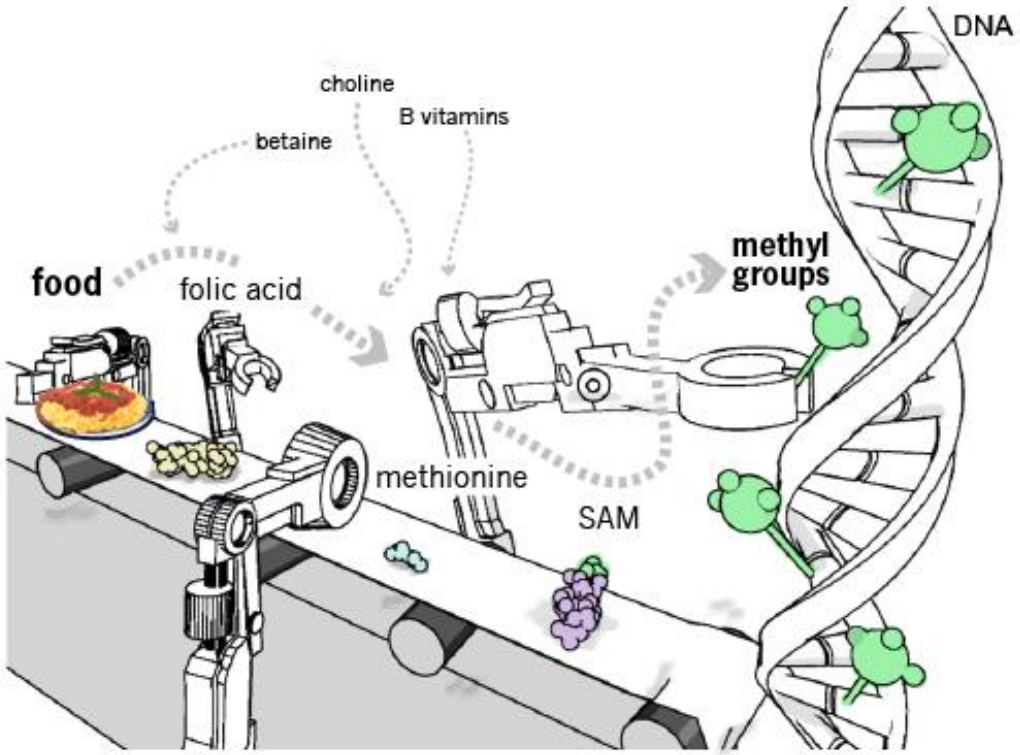


Relative importance of (Epi)genetics (iii)

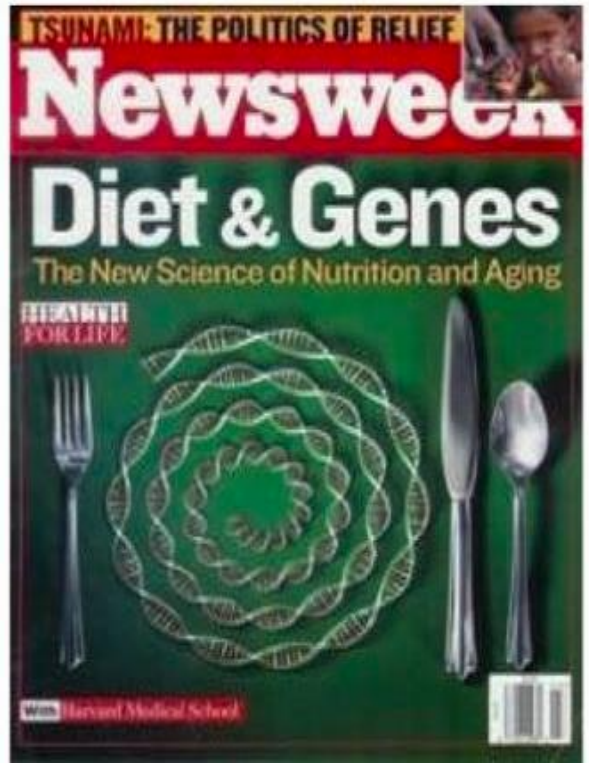
- Actionability* and integration of intrinsic with environmental signals

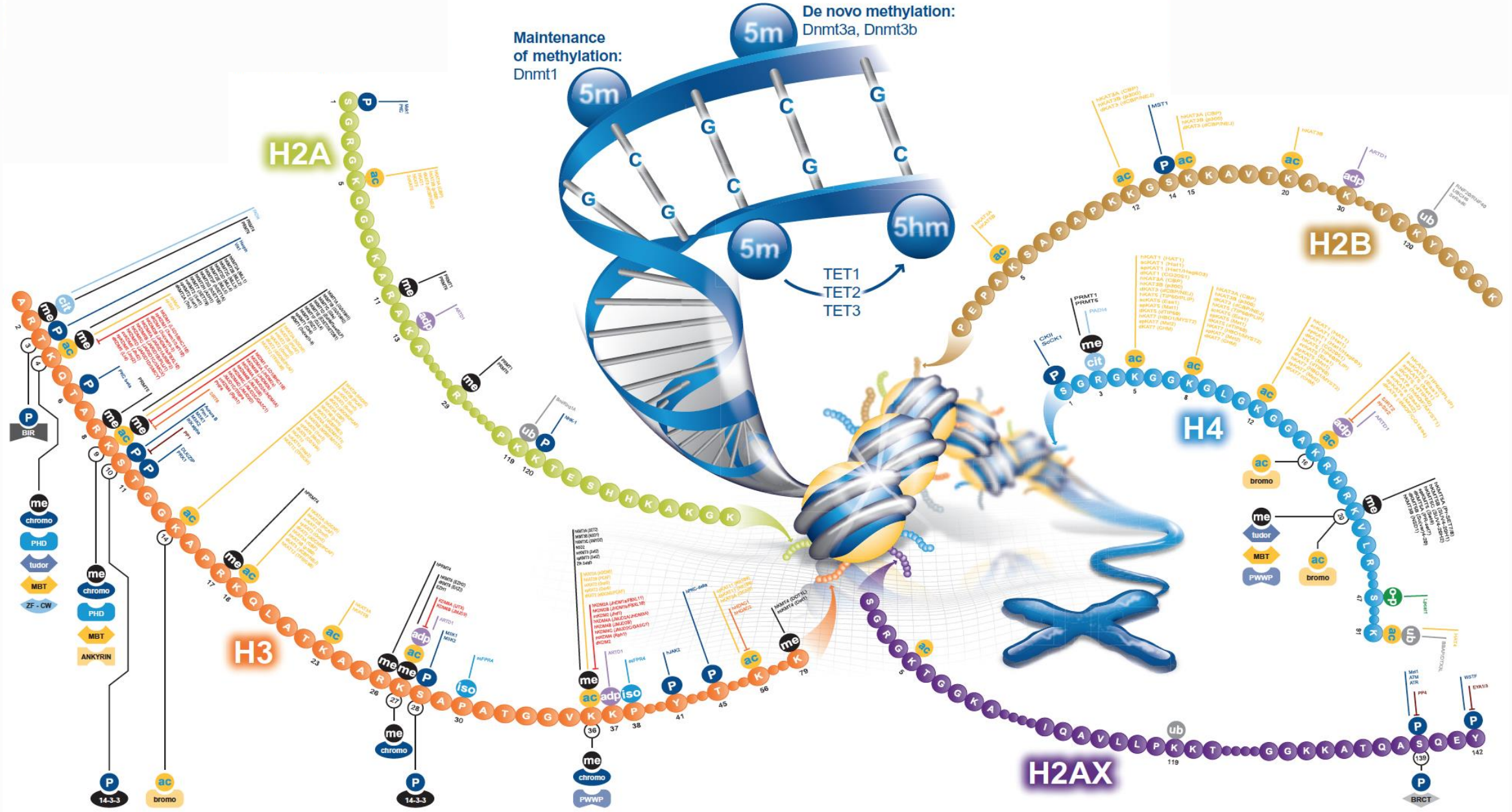



DNA
choline
B vitamins
betaine
food
folic acid
methyl groups
methionine
SAM


DNA
choline
B vitamins
betaine
food
folic acid
methyl groups
methionine
SAM

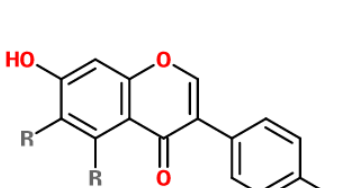

TIME
WHY YOUR DNA ISN'T YOUR DESTINY
The new science of epigenetics reveals how the choices you make can change your genes —and those of your kids
BY JOHN CLOUD


TSUNAMI: THE POLITICS OF RELIEF
Newsweek
Diet & Genes
The New Science of Nutrition and Aging
FOR LIFE

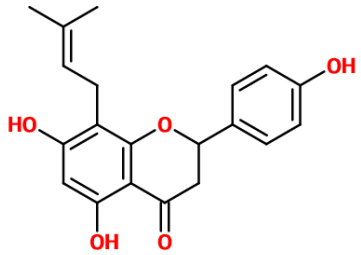


Phyto-oestrogens

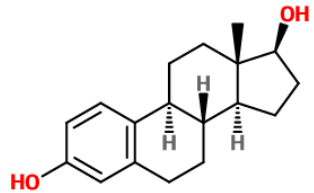
- Structure – natural products are



base structure isoflavonen



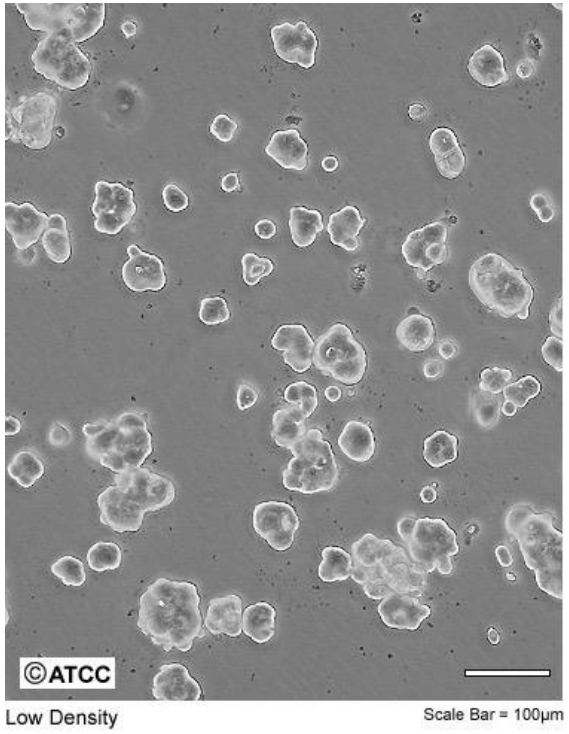
8-prenylnaringinine (PN)



17-β-estradiol.

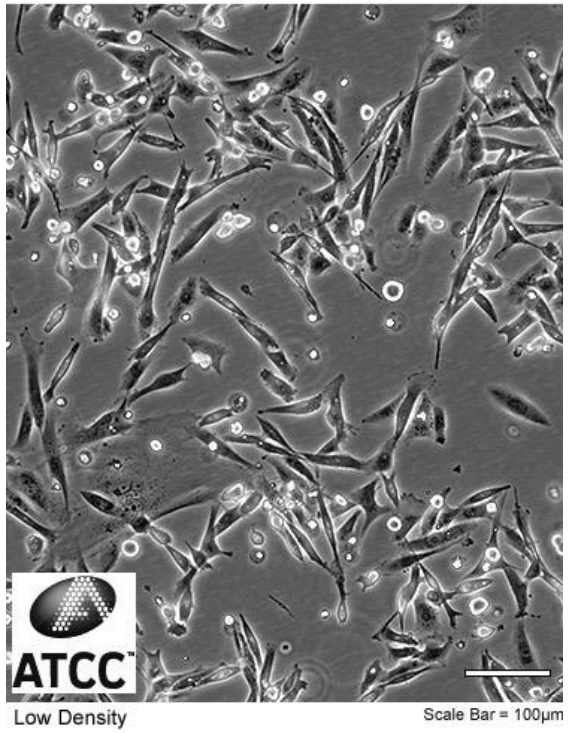
- α- en β-receptors
- Epigenetic modifier ?

Method



MCF-7 cellen

ER+

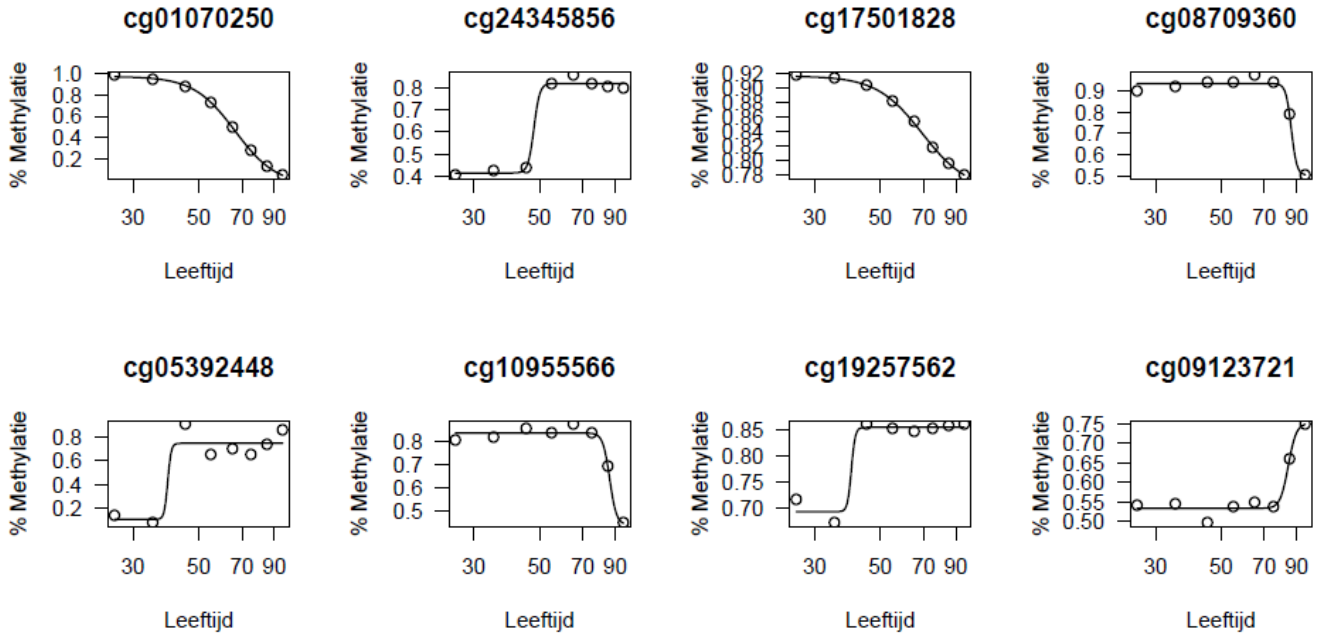


MDA-MB-231 cellen

ER-

Data analysis

- 450K Beadchip array (Illumina)
- Dose-response curves with active compound (8-PN)



SCIENTIFIC REPORTS

OPEN

Exploratory analysis of the human breast DNA methylation profile upon soymilk exposure

Received: 23 April 2018
Accepted: 24 August 2018
Published online: 11 September 2018

Louis Coussement[1], Selin Bolca[1], Wim Van Criekinge[1,2,3], Geert Trooskens[1], Klaas Mensaert[1], Katrien Poels[4], Nathalie Roche[5], Phillip Blondeel[5], Lode Godderis[4], Herman Depypere[6] & Tim De Meyer[1,2,3]

Upon soy consumption, isoflavone metabolites attain bioactive concentrations in breast tissue possibly affecting health. Though *in vitro* epigenetic activity of soy metabolites has been described, the *in vivo* impact on the epigenome is largely unknown. Therefore, in this case-control study, the breast glandular tissue DNA methylome was explored in women undergoing an aesthetic breast reduction. After a run-in phase, 10 generally healthy Belgian or Dutch women received soymilk for 5 days. MethylCap-seq methylation profiles were compared with those of 10 matched controls. Isoflavones and their microbial metabolites were quantified in urine, serum, and glandular breast tissue (liquid chromatography-mass spectrometry) and 17β-estradiol in glandular breast tissue (immunoassay). Global DNA methylation levels were obtained for 6 cases and 5 controls using liquid chromatography-mass spectrometry. Although lower MethylCap-seq coverages were observed, mass spectrometry results and computational LINE-1 methylation analysis did not provide evidence supporting global methylation alterations upon treatment. At a false discovery rate of 0.05, no differentially methylated loci were identified. Moreover, a set of previously identified loci was specifically tested, but earlier reported results could not be validated. In conclusion, after a 5-day soymilk treatment, no major general epigenetic reprogramming in breast tissue could be found in this exploratory study.

Evidence based phytotherapy

Fermented **Soy**

Active metabolite **Equol**

Equol: natural agonist **ER-beta** receptor

anti-proliferation and **anti-inflammatoir** effect

Health, Science & Nutrition
Uw referentie in fytotherapeutica

Foodomics 2.0

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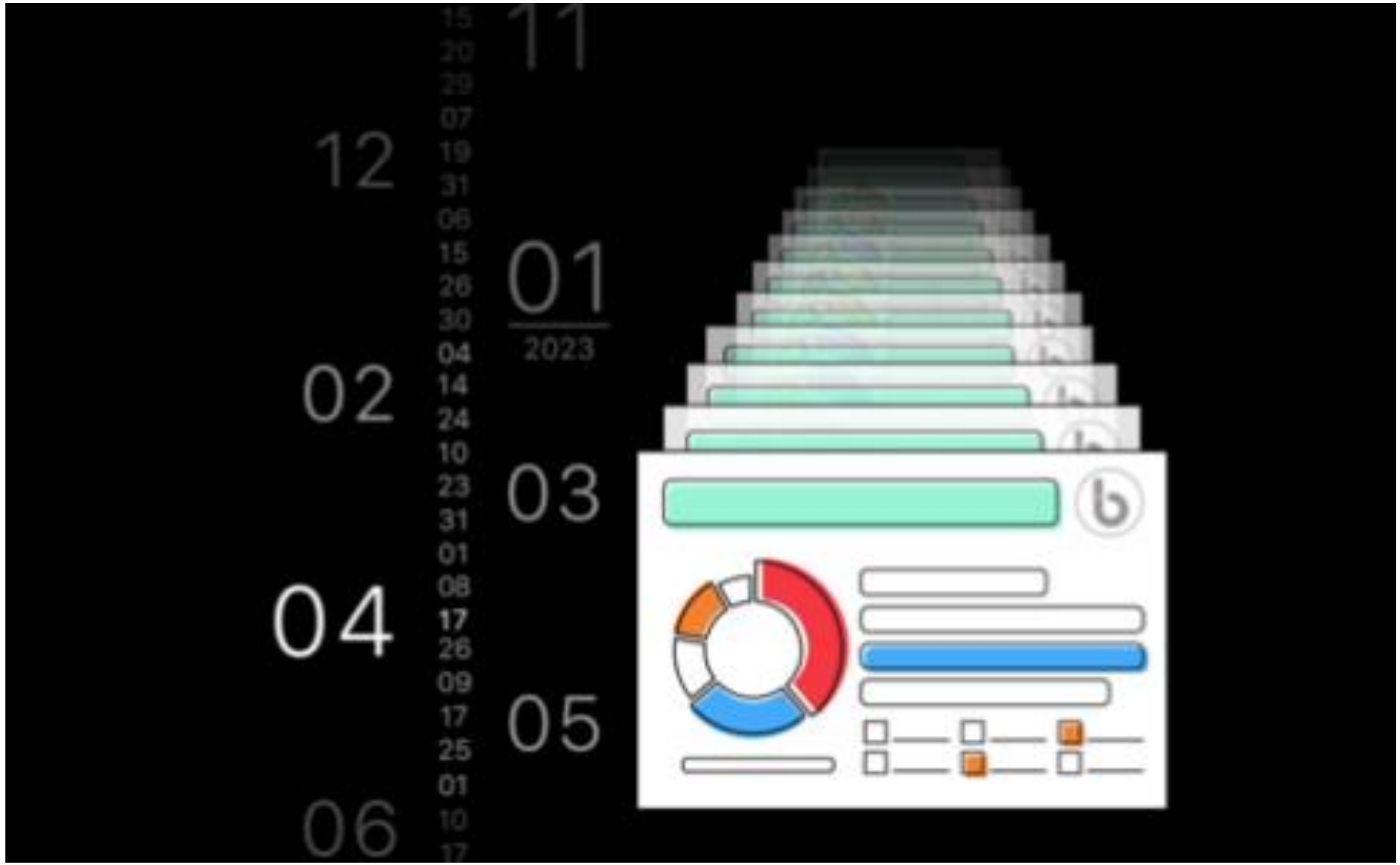
We Are More Bacteria Than Human

- Healthy adult harbors ~100 trillion bacteria in gut alone (10x the number of human cells we possess)
- Communal gut microbial genome (microbiome) is ~150 times larger than human genome
- Reasonable to view microbiome as an organ
- Is dominated by 4 large groups of bacteria: *Actinobacteria*, *Bacteroidetes*, *Firmicutes*, *Proteobacteria*

uBiome


Explore Your Microbiome
3 Simple Steps to Sample
1
Sign up at
2
Sample
3
Ship


bdc
RESOURCES
SCHOOLS
SPONSORS
SUMMIT
LEARN. CREATE. GROW.
Biodesign Challenge


11
12
01
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takes you bac to
NOVEMBER 3RD, 201
takes you bac to
FEBRUARY 24TH, 2023
takes you bac to
GUST 15TH, 2022


bactoyou bac-up pills
takes you bac to
FEBRUARY 24TH, 2023
100mg x 7 of sample # 000118632

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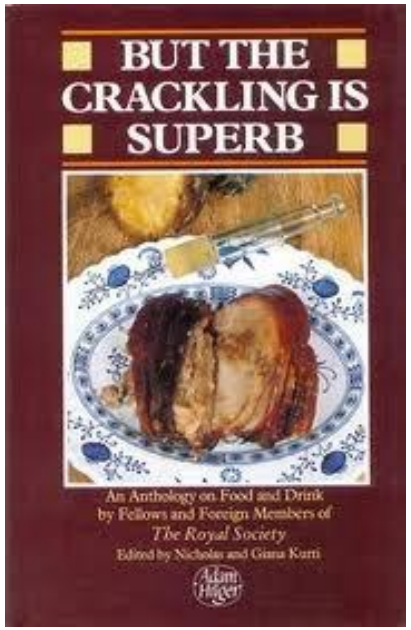
Minima

The elementary biology lab


MinION


SAY BIG DATA
ONE MORE TIME


BUT THE CRACKLING IS SUPERB
An Anthology on Food and Drink
by Fellows and Foreign Members of
The Royal Society
Edited by Nicholas and Giana Kurti
Adam Hilger

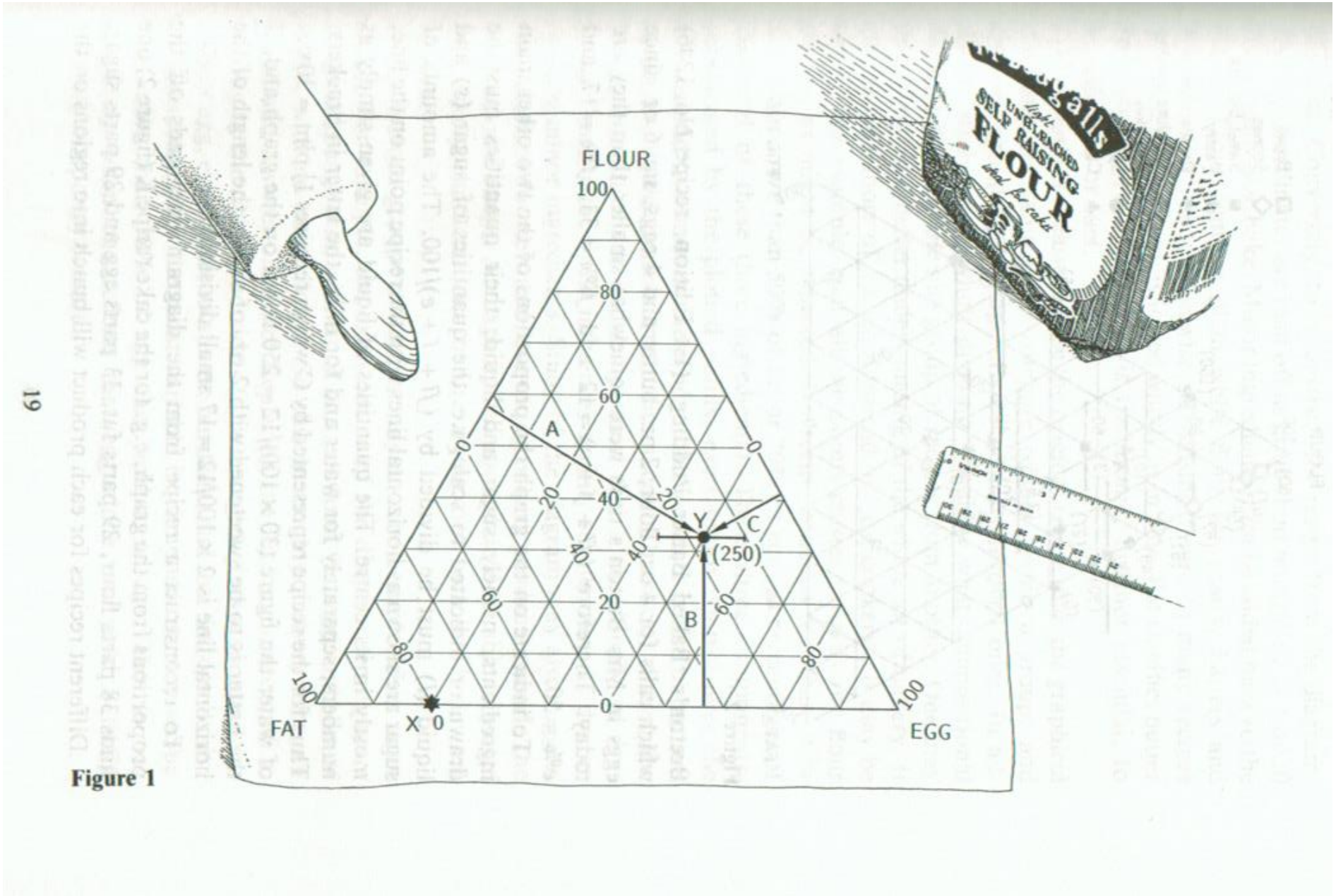

FLOUR
100
80
60
40
20
0
A
Y
C
(250)
B
X 0
FAT
EGG
100
80
60
40
20
0

Figure 1

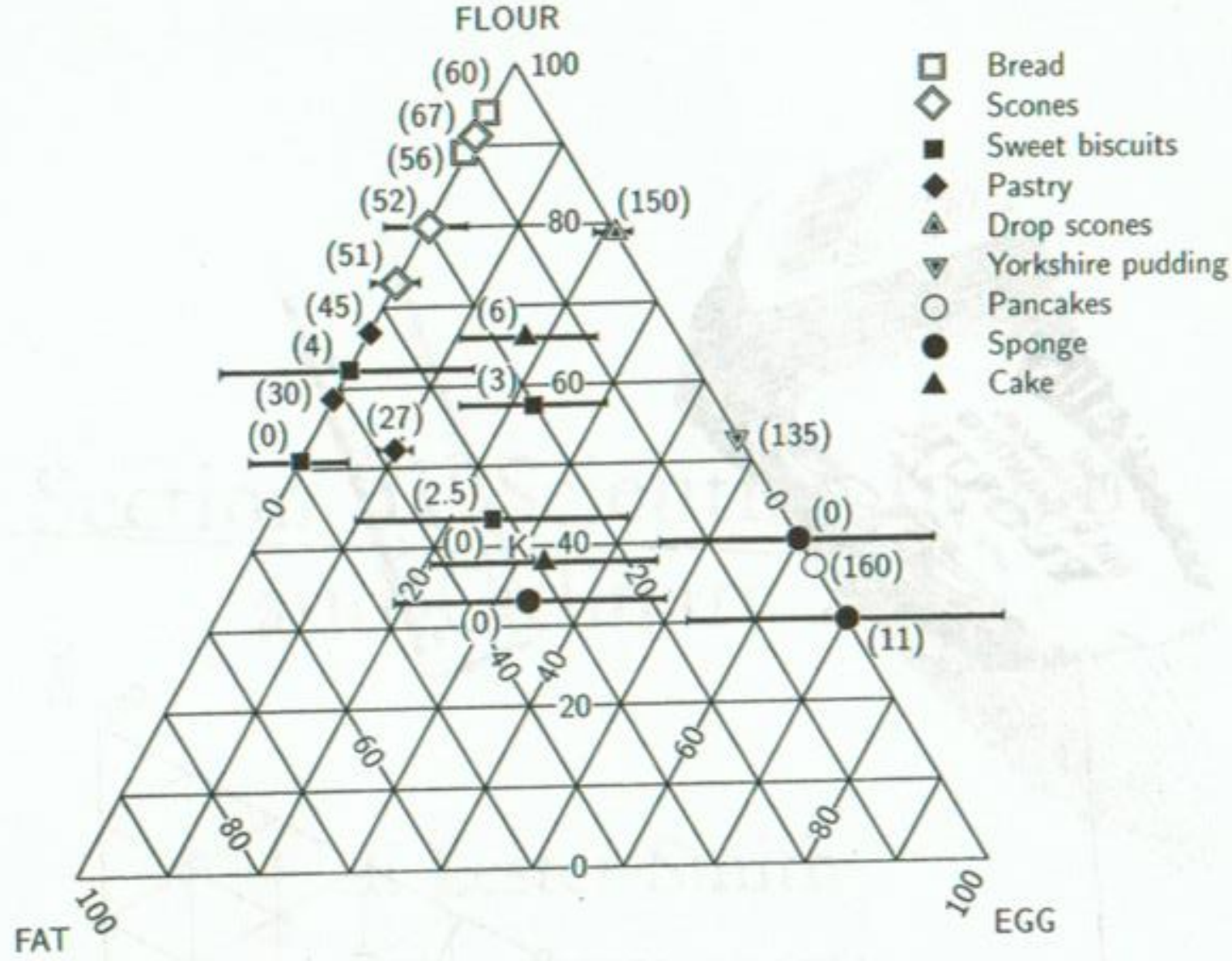

FLOUR
FAT
EGG
Bread
Scones
Sweet biscuits
Pastry
Drop scones
Yorkshire pudding
Pancakes
Sponge
Cake
(60)
(67)
(56)
(52)
(51)
(45)
(4)
(30)
(0)
(27)
(2.5)
(0)
(6)
(3)
(135)
(0)
(160)
(11)
(0)
K
100
80
60
40
20
0

Figure 2

A SURVEY OF FOOD RECOMMENDERS

A PREPRINT

Carl Anderson
Weight Watchers International
New York, USA
carl.anderson@weightwatchers.com

September 18, 2018

ABSTRACT

Everyone eats. However, people don't always know what to eat. They need a little help and inspiration. Consequently, a number of apps, services, and programs have developed recommenders around food. These cover food, meal, recipe, and restaurant recommendations, which are the most common use cases, but also other areas such as substitute ingredients, menus, and diets. The latter is especially important in the area of health and wellness where users have more specific dietary needs and goals.

In this survey, we review the food recommender literature. We cover the types of systems in terms of their goals and what they are recommending, the datasets and signals that they use to train models, the technical approaches and model types used, as well as some of the system constraints.

Keywords: Personalization · Food recommendation · Recommendation systems · Collaborative filtering · Content-based recommenders · Expert systems

A Survey of Food Recommenders

A Preprint

Carl Anderson
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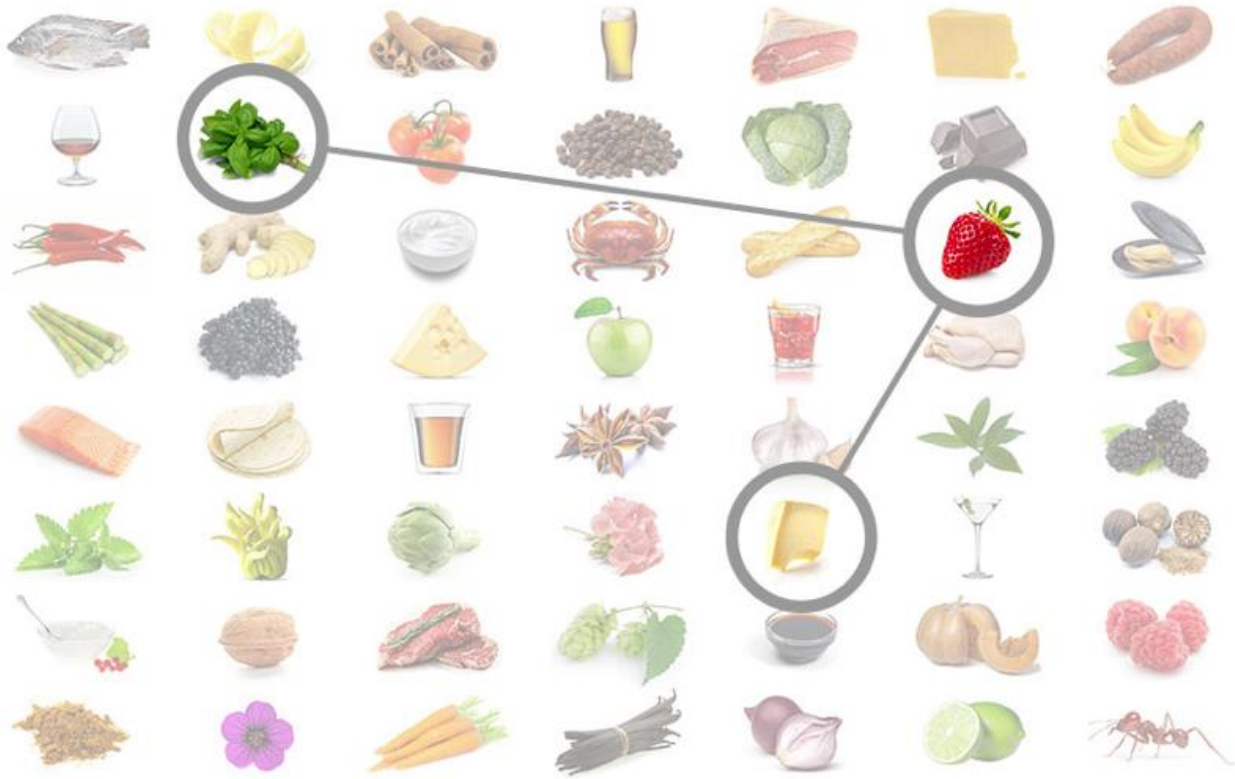
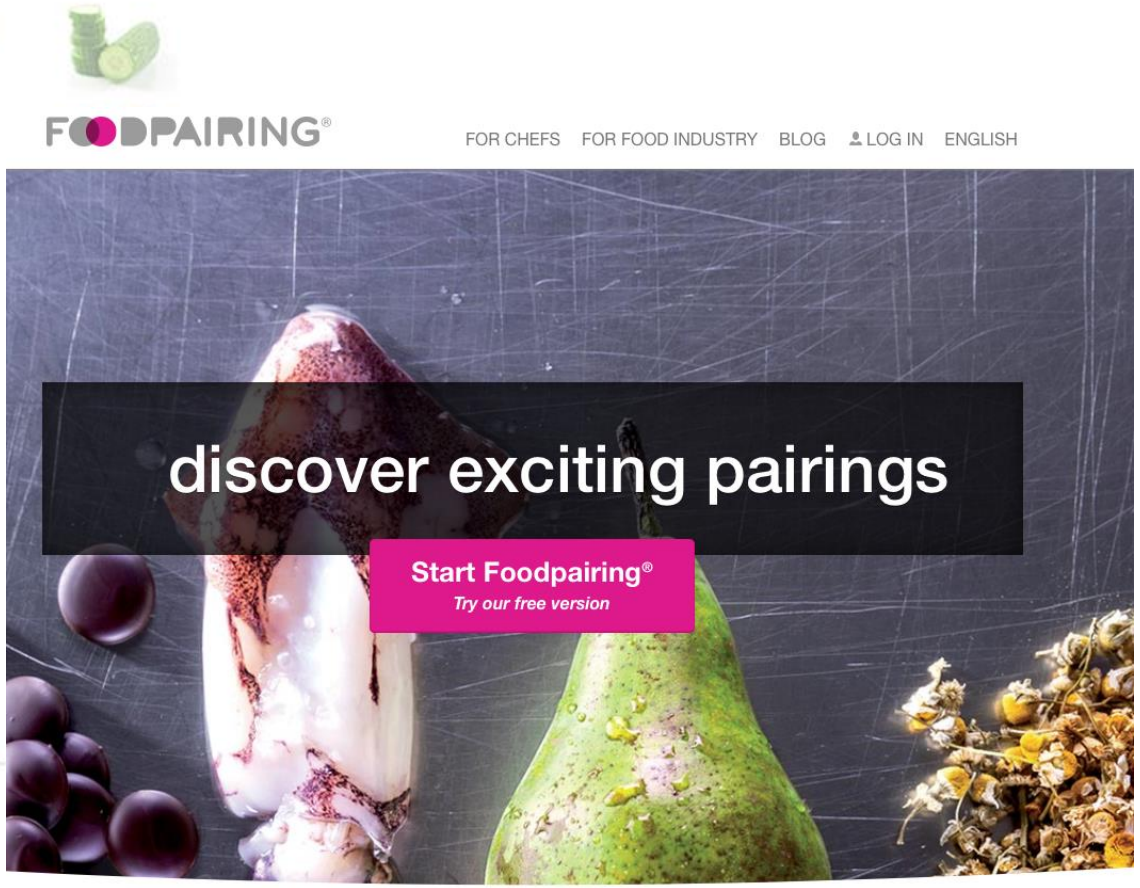
Keywords: Personalization · Food recommendation · Recommendation systems · Collaborative filtering · Content-based recommenders · Expert systems

Add textmining (patents), phylogenetic data

The Science behind Foodpairing®

Foodpairing is a scientific method to identify which foods & drinks go well together. To understand why ingredients match it's important to know how humans perceive flavour.





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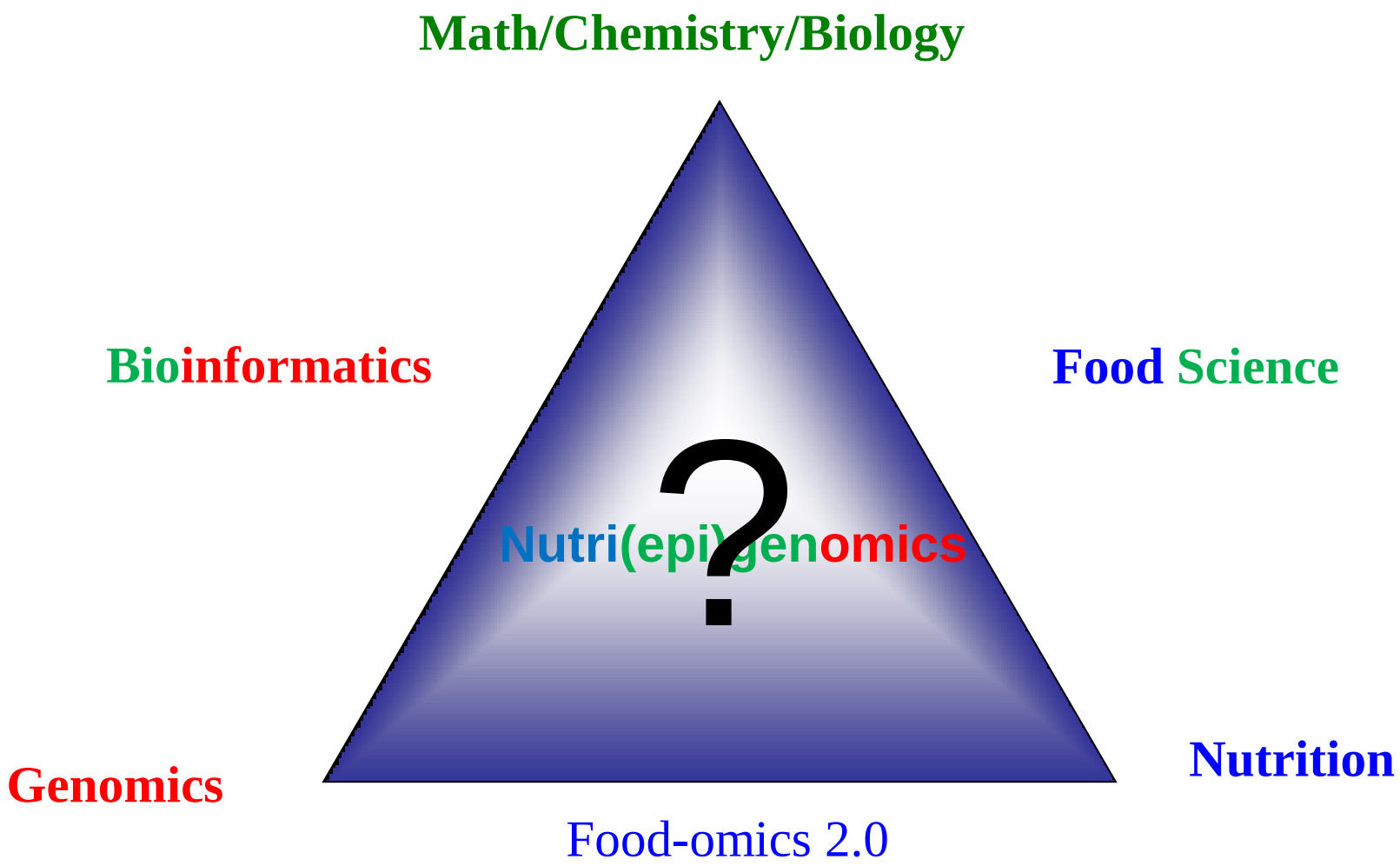

"*a discipline that studies the Food and Nutrition domains through the application and integration of advanced -omics technologies to improve consumer's well-being, health, and knowledge*".