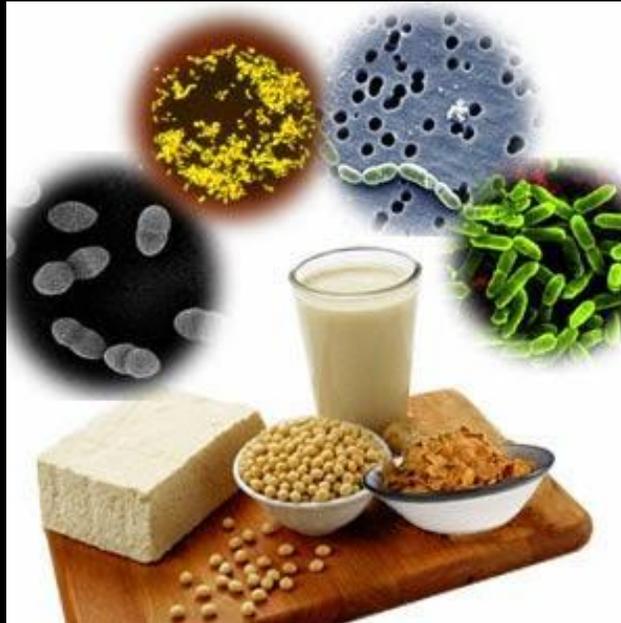


La microbiota alimentaria: un ecosistema a descubrir

Dra. Guiomar Melgar Lalanne
Instituto de Ciencias Básicas- Universidad Veracruzana

Mi única virtud y defecto es ser imperfecta

Rebeca Lane



S.XIX-S.XXI. It's evolution baby... (Pearl Jam)

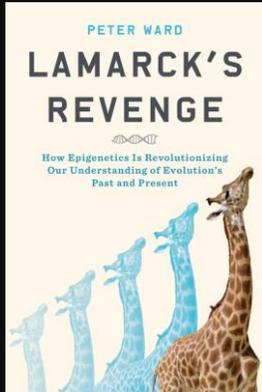
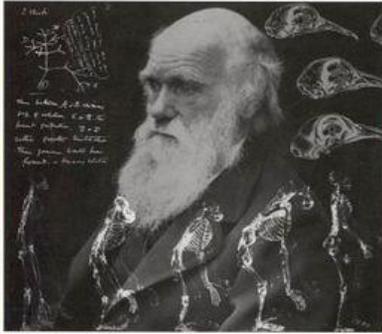
JEAN-BAPTISTE
LAMARCK
Investigaciones sobre la
organización de los cuerpos vivos
Edición de FRANCISCO IBERRIBEGARAY FUENTES



KRK

El origen
de las especies

CHARLES DARWIN

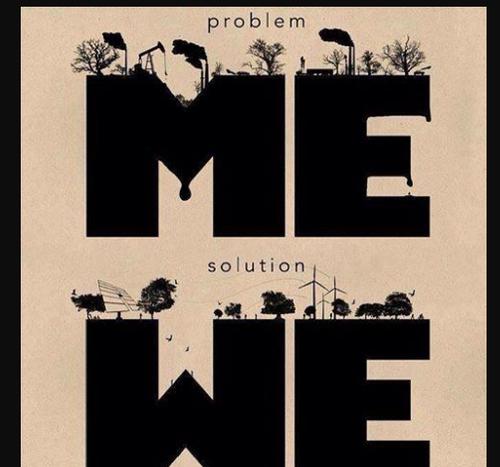
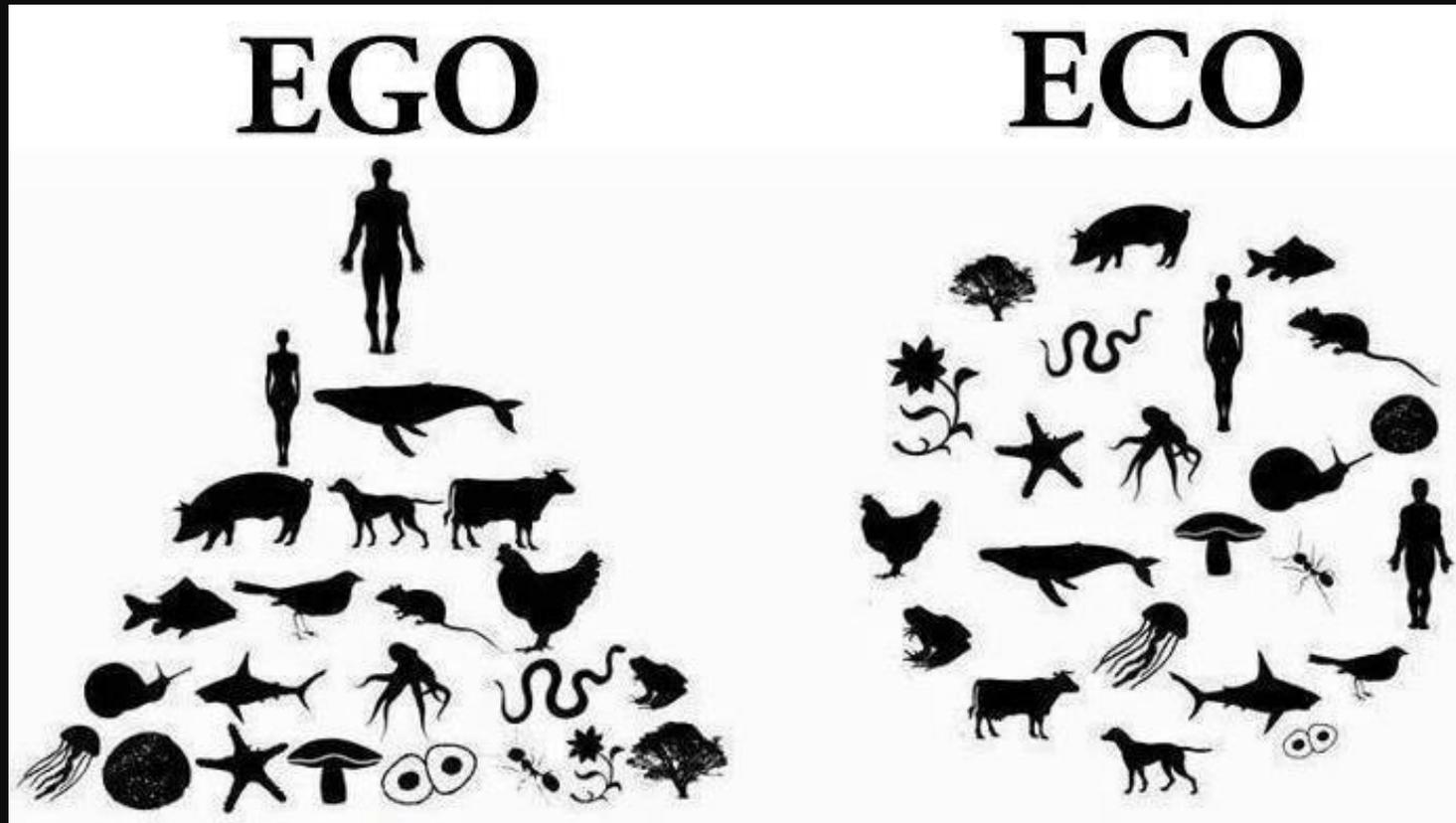


"Lo que nos hace
humanos es nuestra
habilidad para
hacer preguntas"
Jane Goodall



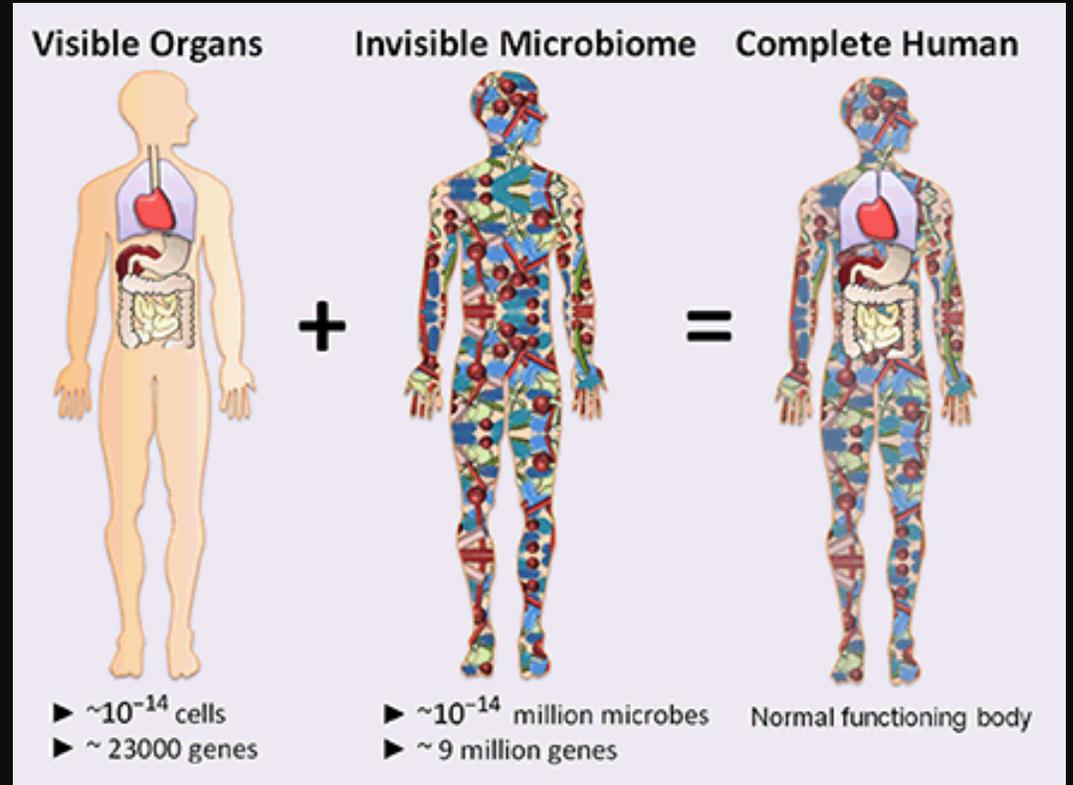
Lynn Margulis
(1938-2011)

S.XX-S.XXI Tras el genoma humano... y muchas otras cosas
El derrumbe del individualismo...

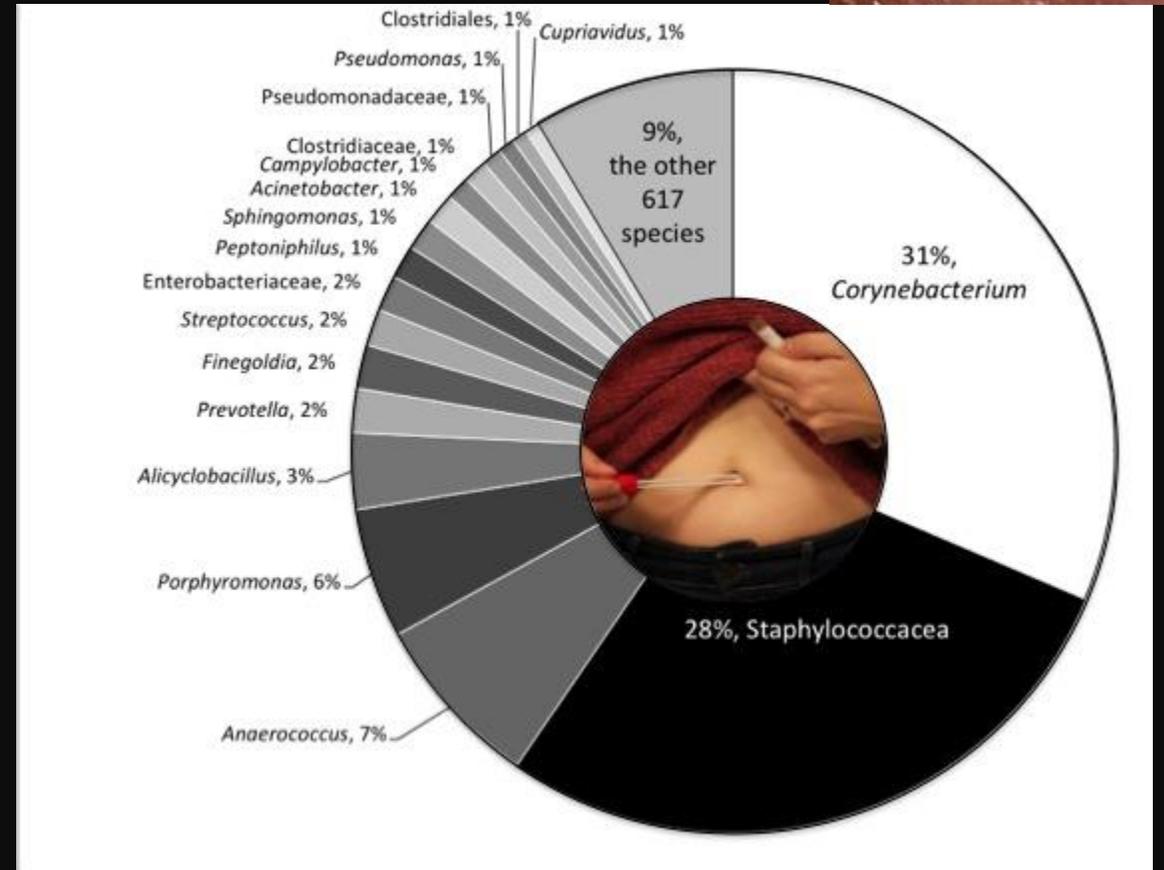


Del individuo al ecosistema humano

El supra-organismo humano



2008. Mirarse el ombligo...



Belly Button Bacteria and Fungi Spores under the scanning electron microscope
(<http://www.micronaut.ch/shop/microbes-on-our-body-doing-things-together-makes-a-difference/>)

2012

I am a bacterial girl living in a bacterial world...

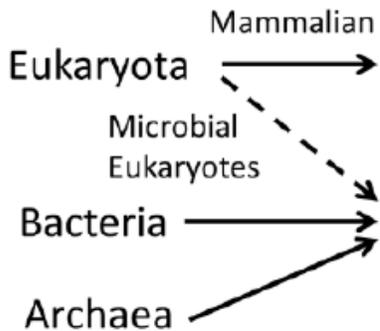


The Complete Human: Three Domains of Life

Domains of Life

Genomes

Superorganism



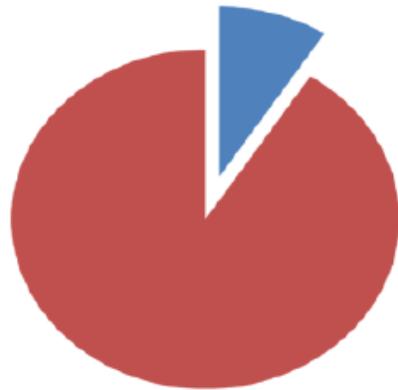
First
~ 25,000 genes

Second
~ 10 million genes

Majority-
Microbial
Humans
(based on cell
and gene
numbers)

Composition

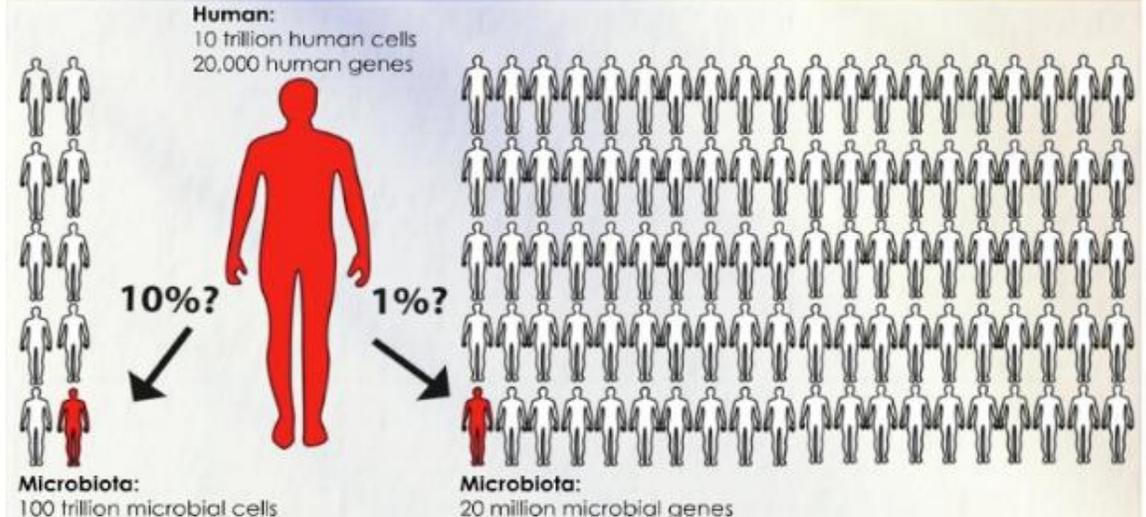
Approximately
90% microbial
by cell number



■ Mammalian
■ Microbial

Who Are We?

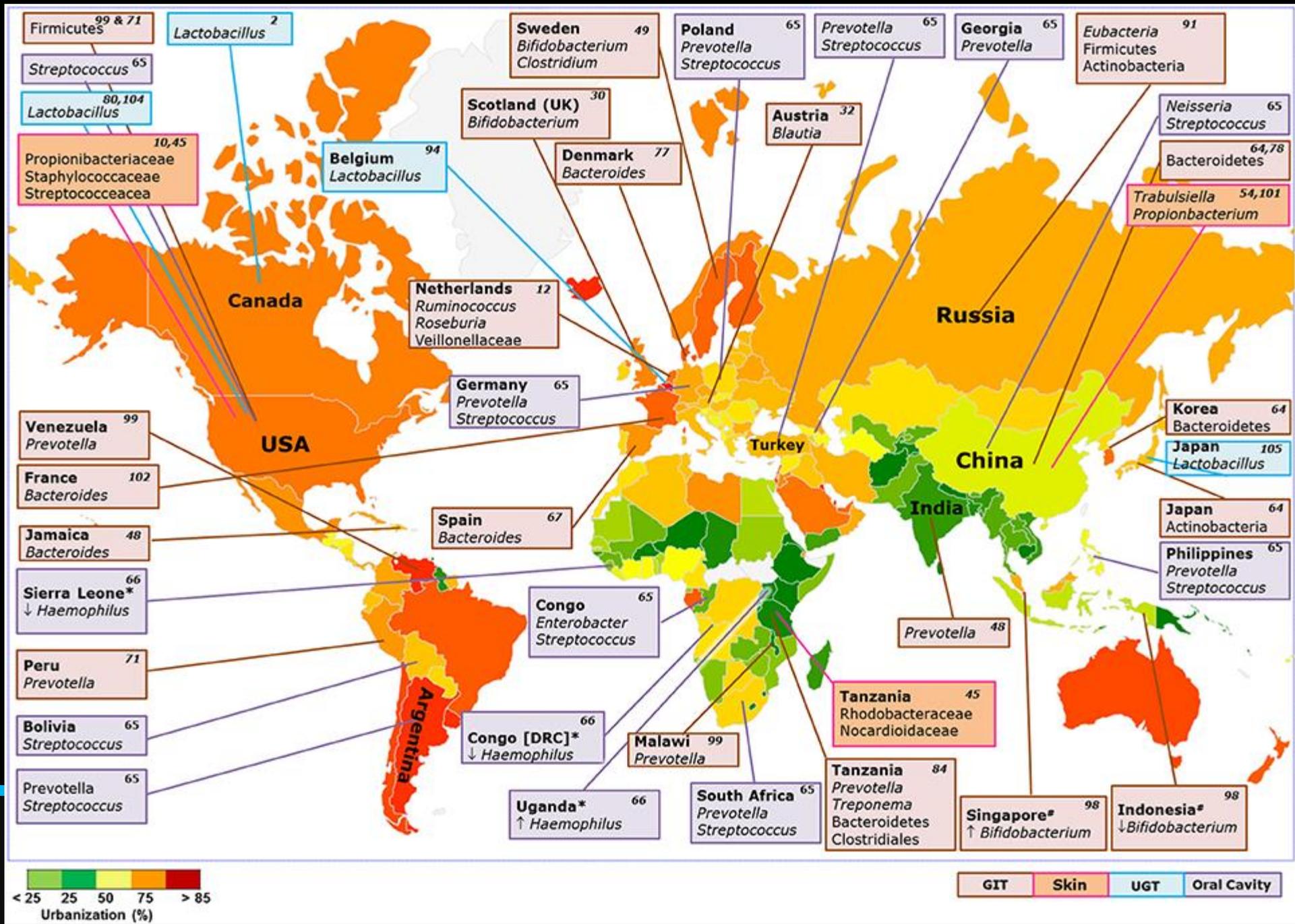
Microbial abundance raises the question: how human are we?



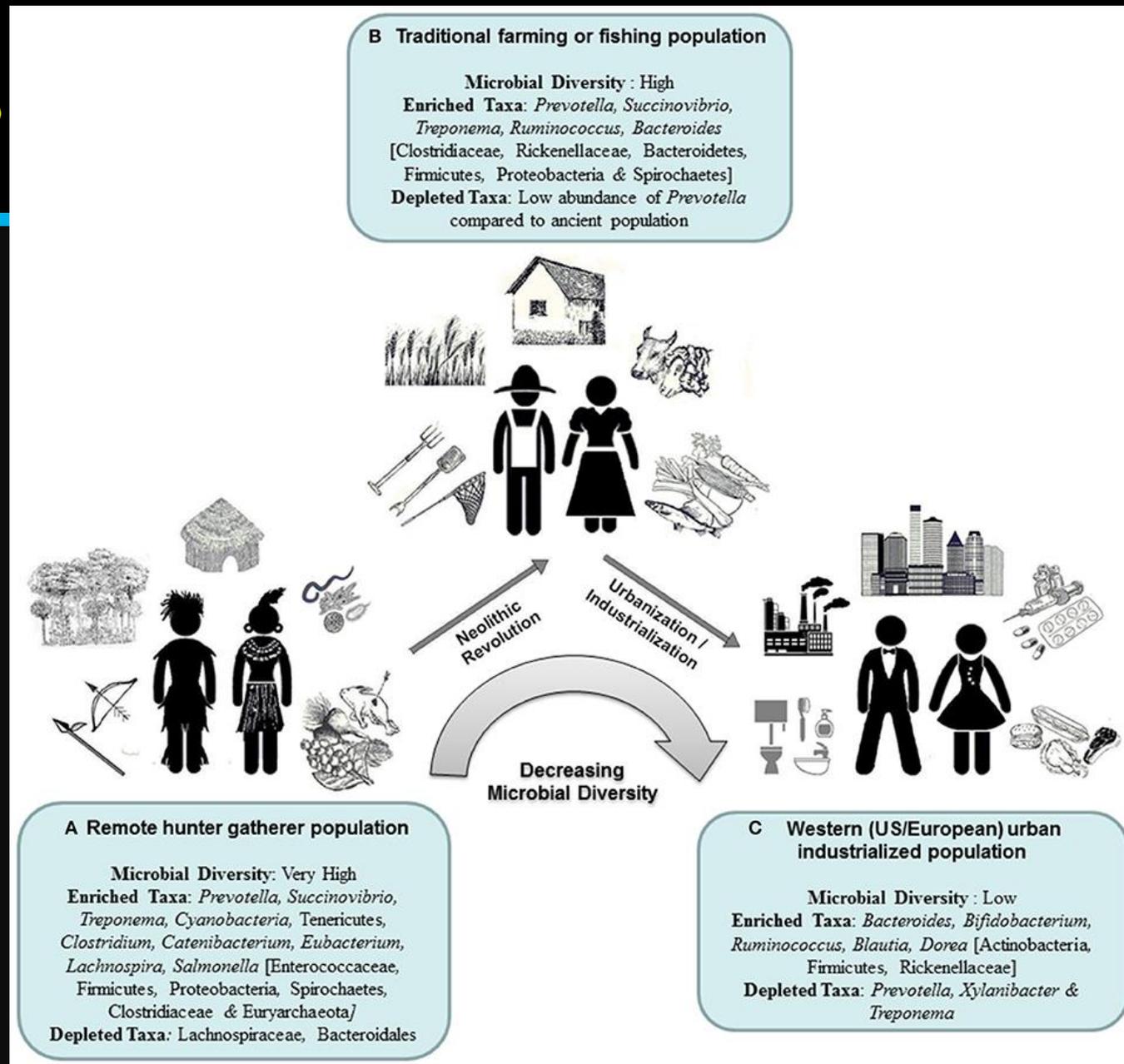
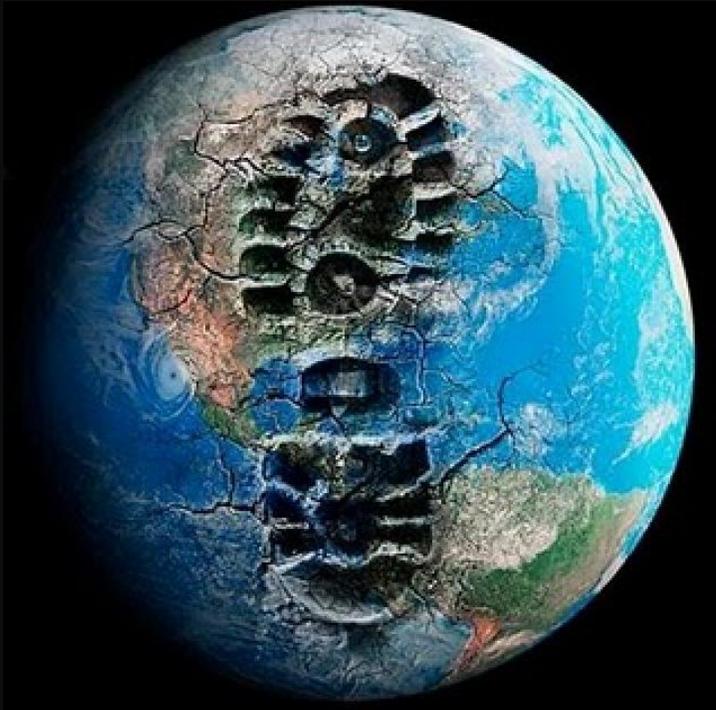
99.9% of our genomes the same, but our microbes...?

Michah Hamady, PhD thesis, 2009

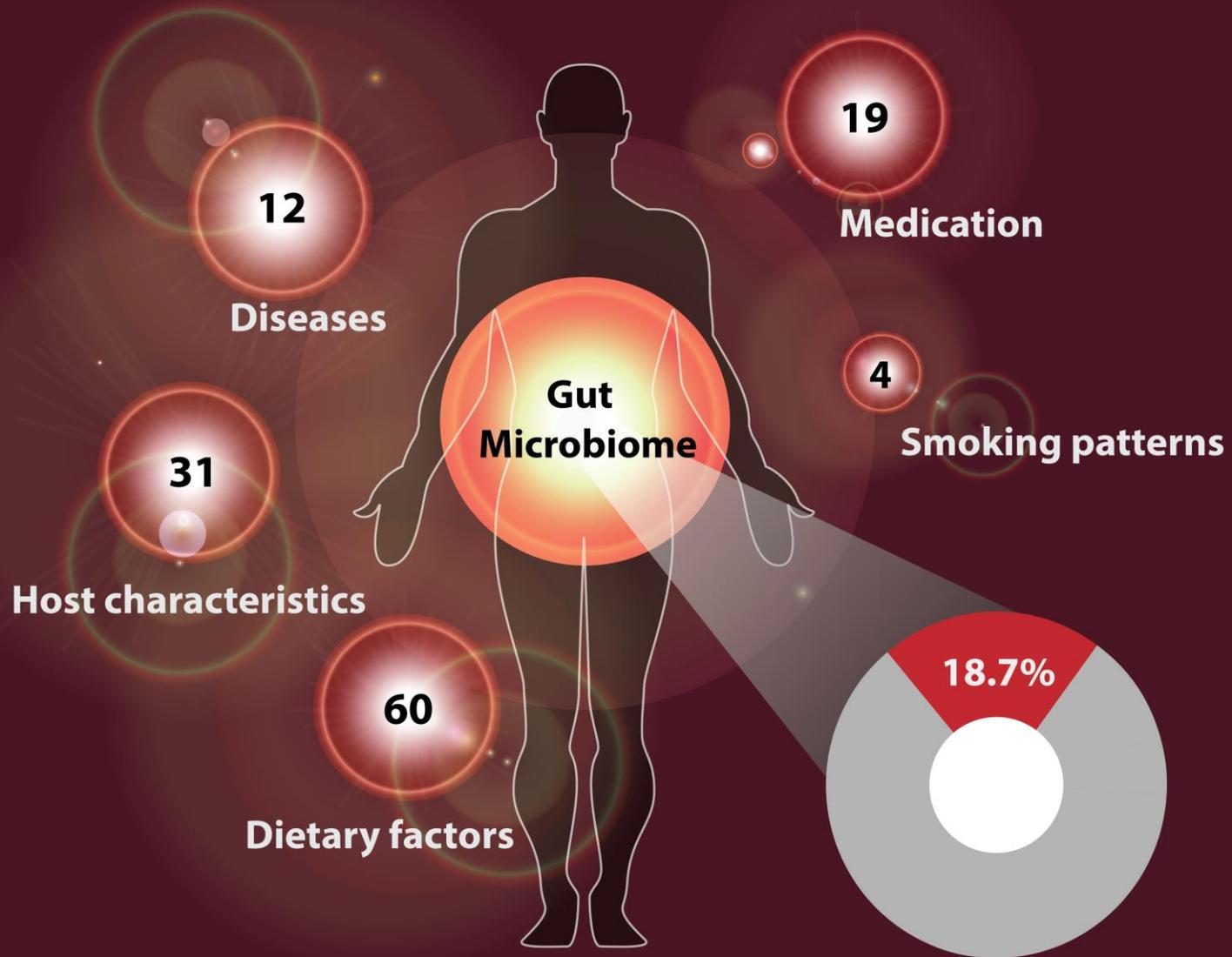
© 2012 by Jonathan Eisen for BIO20 at UC Davis Spring 2014



Un ecosistema en crisis



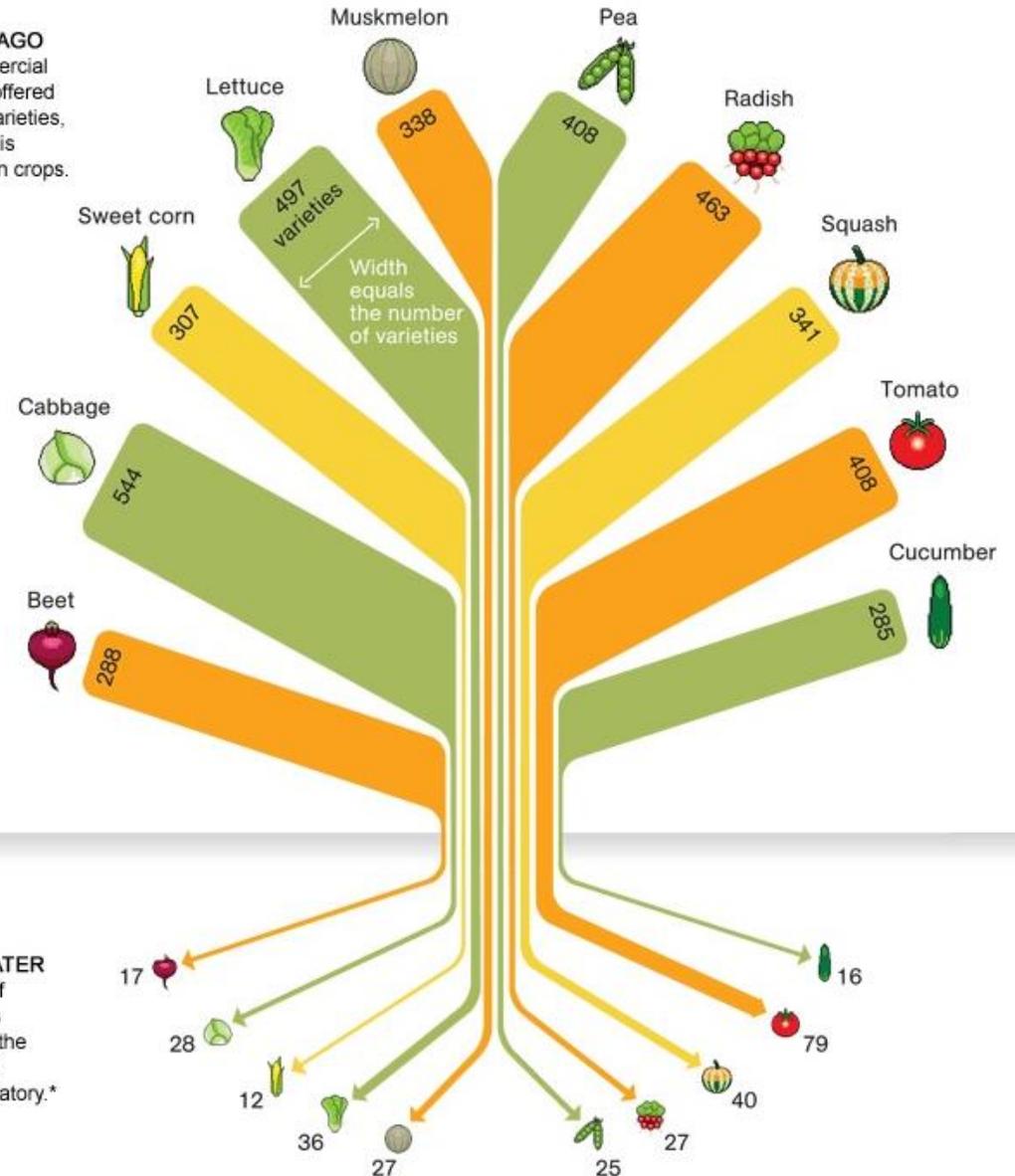
18.7% of Inter-individual Variation in Gut Microbiome Explained



Pérdida de la diversidad alimentaria



A CENTURY AGO
 In 1903 commercial seed houses offered hundreds of varieties, as shown in this sampling of ten crops.

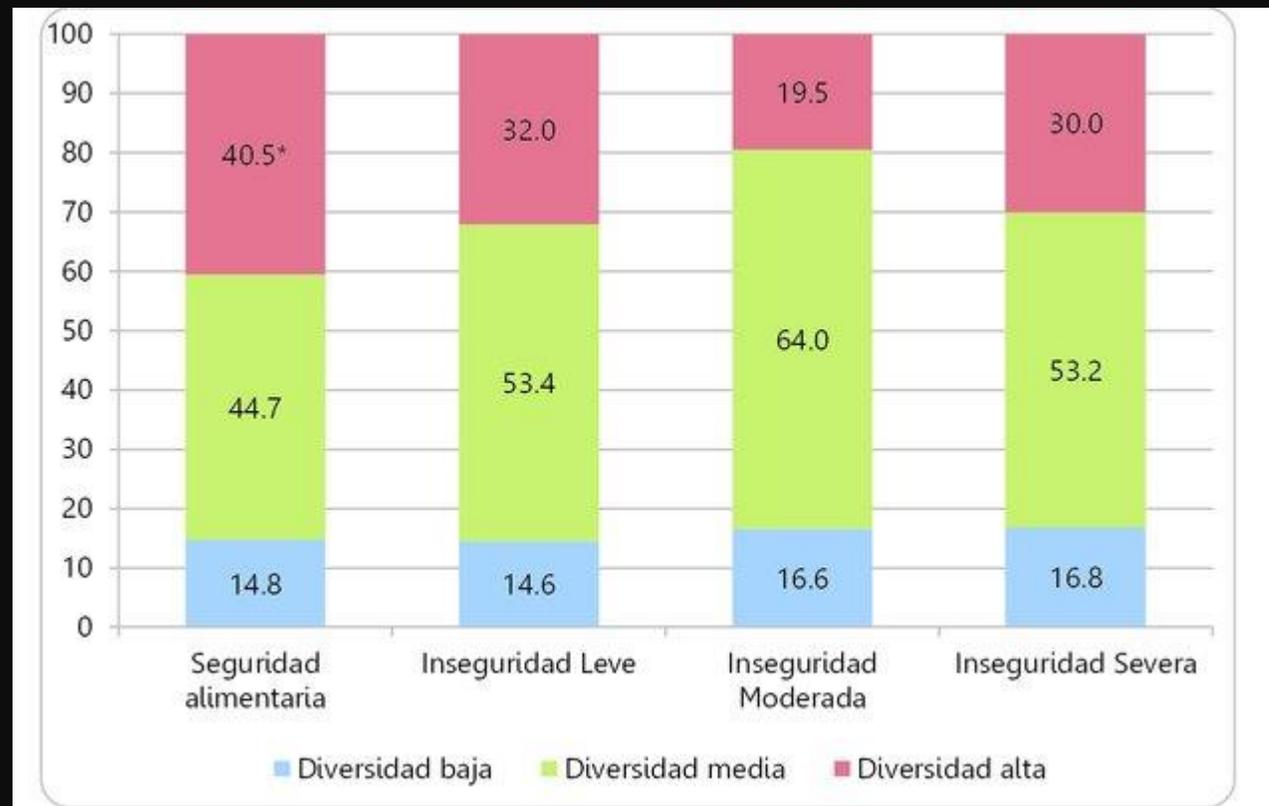


80 YEARS LATER
 By 1983 few of those varieties were found in the National Seed Storage Laboratory.*

* CHANGED ITS NAME IN 2001 TO THE NATIONAL CENTER FOR GENETIC RESOURCES PRESERVATION

JOHN TOMANIO, NGM STAFF. FOOD ICONS: QUICKHONEY SOURCE: RURAL ADVANCEMENT FOUNDATION INTERNATIONAL

¿Comemos menos variado?



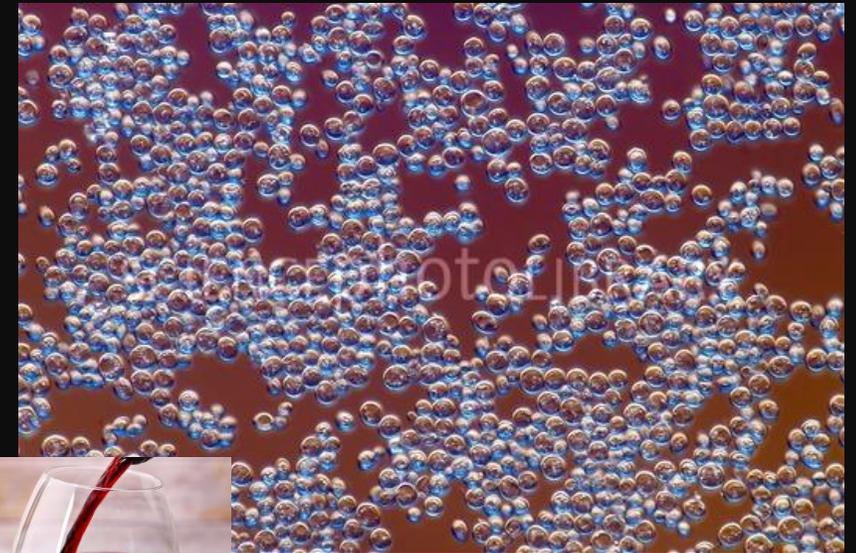
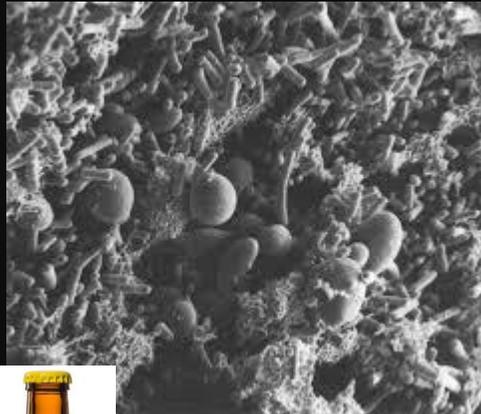
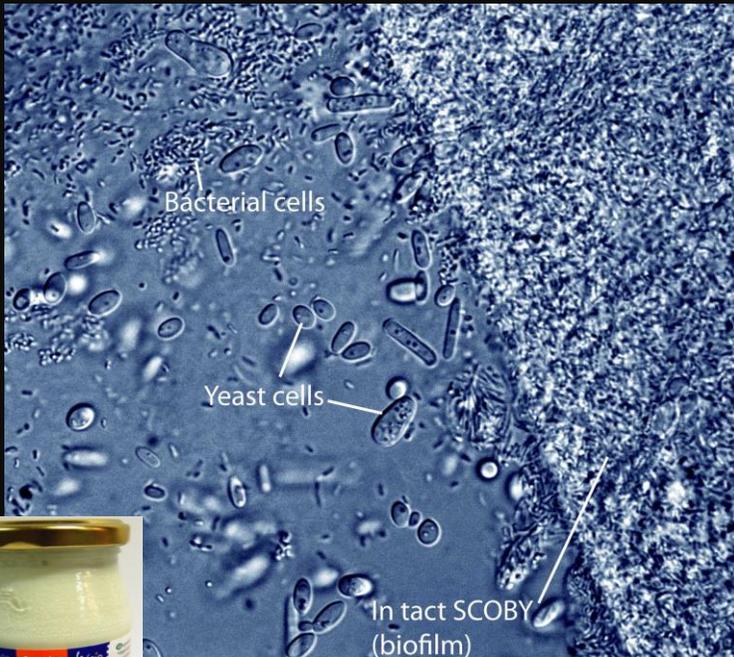
Los alimentos fermentados... Más de los que parecen



Common Fermented Foods



Ecosistemas microbianos por dentro



Traditional fermented beverages from Mexico as a potential probiotic source

Haydee Eliza Romero-Luna¹ · Humberto Hernández-Sánchez¹ · Gloria Dávila-Ortiz¹ 

Received: 18 March 2017 / Accepted: 13 July 2017 / Published online: 3 August 2017
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Abstract Fermentation is one of the oldest ways of processing food. Some fermented food is produced industrially, but can also be produced in an artisanal way by certain ethnic groups, called traditional fermented foods. In Mexico, there are a variety of traditional fermented beverages which are produced in an artisanal way. They include those made with maize (*atole agrio*, *pozol*, and *tesgüino*), fruit (*tepache* and *colonche*), and obtained by plant fermentation (*pulque*, *tuba*, and *taberna*). These beverages have been used since ancient times for religious and medicinal purposes. The medicinal effect may be due to fermented microorganisms. The presence of beneficial microorganisms known as probiotics provides beneficial effects to consumer health, improving the balance of intestinal host, and reducing the risk of gastrointestinal diseases, mainly. Most probiotics belong to the genus *Lactobacillus*, but *Bifidobacterium*, *Bacillus*, and yeast are also found. Therefore, it is important that the microbiological diversity of the beverages is studied and documented. This review includes information on the microbial diversity and probiotic potential of the most important traditional fermented beverages from Mexico.

Keywords Traditional fermented beverages · Probiotics · Yeast · Bacteria

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Introduction

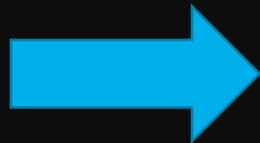
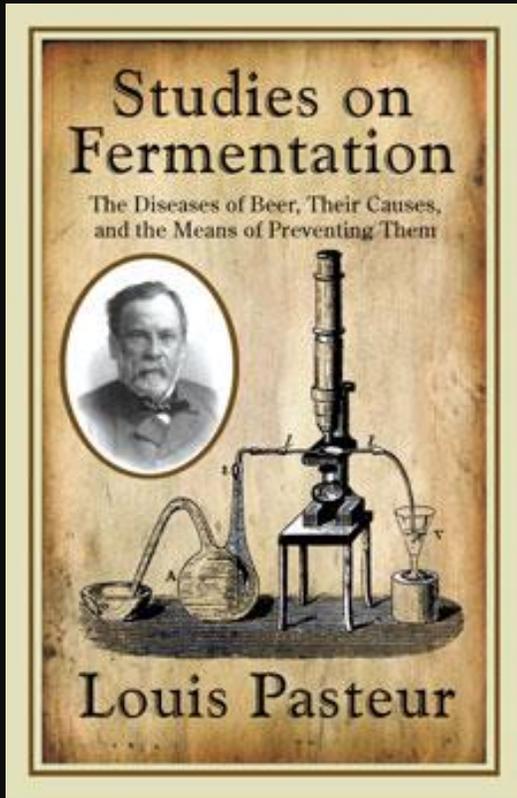
Fermentation is one of the oldest processes for processing and preserving food. The use of microorganisms to prepare food has been known worldwide for thousands of years. The fermented microorganisms can proceed from the natural microbiota or a starter (Sangwan et al. 2014). During this process, the metabolic activities of microorganisms improve the safety, nutritional, and sensory properties of different raw materials, such as dairy products, meat, vegetables, tubers, and cereals, so these microorganisms have significant contributions in the human diet (Sanni et al. 2013; Chilton et al. 2015). These foods are appreciated for their attributes of flavor, aroma, and pleasant texture, and improved cooking and processing properties (Holzapfel 2002).

Fermented foods are accessible to many people, such as those produced industrially (wine, cheese, beer, bread, and yogurt). However, the so-called “traditional fermented foods” are produced in an artisanal or semi-commercial way by certain social or ethnic groups (Olivera-Illana et al. 2002), proving to be part of the gastronomic culture of certain social groups. Several authors point to these foods as an example of “biological ennoblement” due to bioenrichment with essential nutrients during fermentation (Platt 1964). In addition to being a source of beneficial microorganisms which have an important role in food preservation, palatability, and nutrient bioavailability (Champagne et al. 2005), fermented food is also a source of probiotics which have been defined by experts from the Food and Agriculture Organization of the United Nations (FAO)/World Health Organization (WHO) in 2001 as “live microorganisms which when administered in adequate amounts confer a health benefit on the host”.

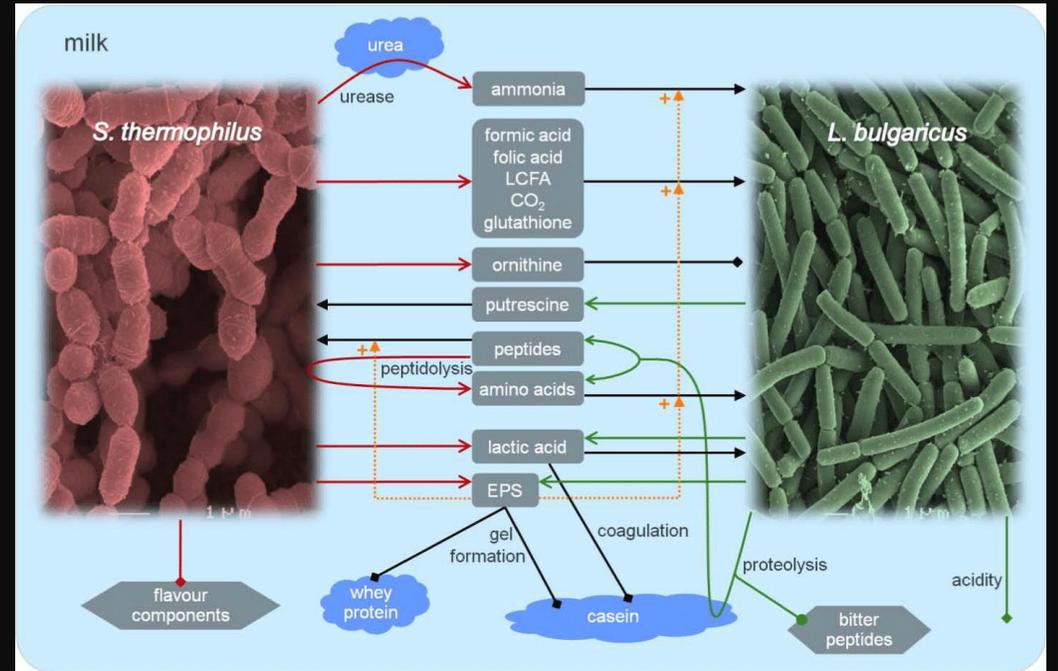
Around the world, there are about 3500 traditional fermented foods from cereals, legumes, tubers, and fruits, where a consortium of bacteria, yeast, and molds are involved,



Volvemos a Pasteur... Cultivos iniciadores



Yogurt: el primer consorcio comercial



De como convertir un alimento saludable en comida chatarra...

Información Nutricional	
Tamaño de porción 1 (una); Frasco (80ml)	
Contenido Energético	233 Kj (55 Kcal)
Proteínas	1,00 g
Grasas	0,04 g
De las cuales	
Grasa saturada	0,03 g
Carbohidratos	12,70 g
De los cuales	
Azúcares	12,70 g
Fibra dietética	0,00 g
Calcio	36,0 mg
Sodio	13,0 mg



¿Que los niños no entienden?...

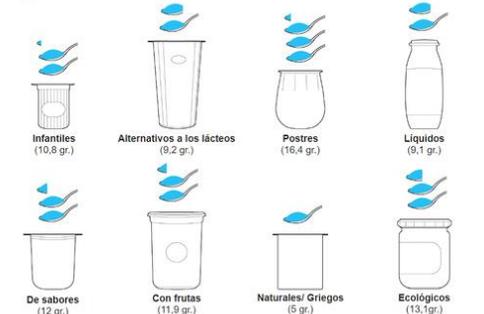
A grid of 28 items, each with a quantity of sugar in spoonfuls and an illustration of the product:

- 2.5 CUCHARADAS DE AZÚCAR: Yakult
- 2.5 CUCHARADAS DE AZÚCAR: Fanta
- 4 CUCHARADAS DE AZÚCAR: M&M's
- 2.5 CUCHARADAS DE AZÚCAR: Kit Kat
- 3 CUCHARADAS DE AZÚCAR: Nesquik
- 3 CUCHARADAS DE AZÚCAR: Coca-Cola
- 5 CUCHARADAS DE AZÚCAR: Yogurtito
- 5 CUCHARADAS DE AZÚCAR: Aduces
- 3 CUCHARADAS DE AZÚCAR: Jumex
- 4 CUCHARADAS DE AZÚCAR: M&M's
- 5.5 CUCHARADAS DE AZÚCAR: M&M's
- 3.5 CUCHARADAS DE AZÚCAR: Nido
- 4.5 CUCHARADAS DE AZÚCAR: Fanta
- 4.5 CUCHARADAS DE AZÚCAR: Nido
- 1.5 CUCHARADAS DE AZÚCAR: Yogurtito
- 3 CUCHARADAS DE AZÚCAR: M&M's
- 2.2 CUCHARADAS DE AZÚCAR: Choco Pops
- 3.2 CUCHARADAS DE AZÚCAR: Tiramisú
- 1 CUCHARADA DE AZÚCAR (POR GALLETA): Galletas
- 7 CUCHARADAS DE AZÚCAR: Oreo

... Ahora ya sabes quién es el que no entiende.

Cantidad de azúcar que tienen los yogures del supermercado

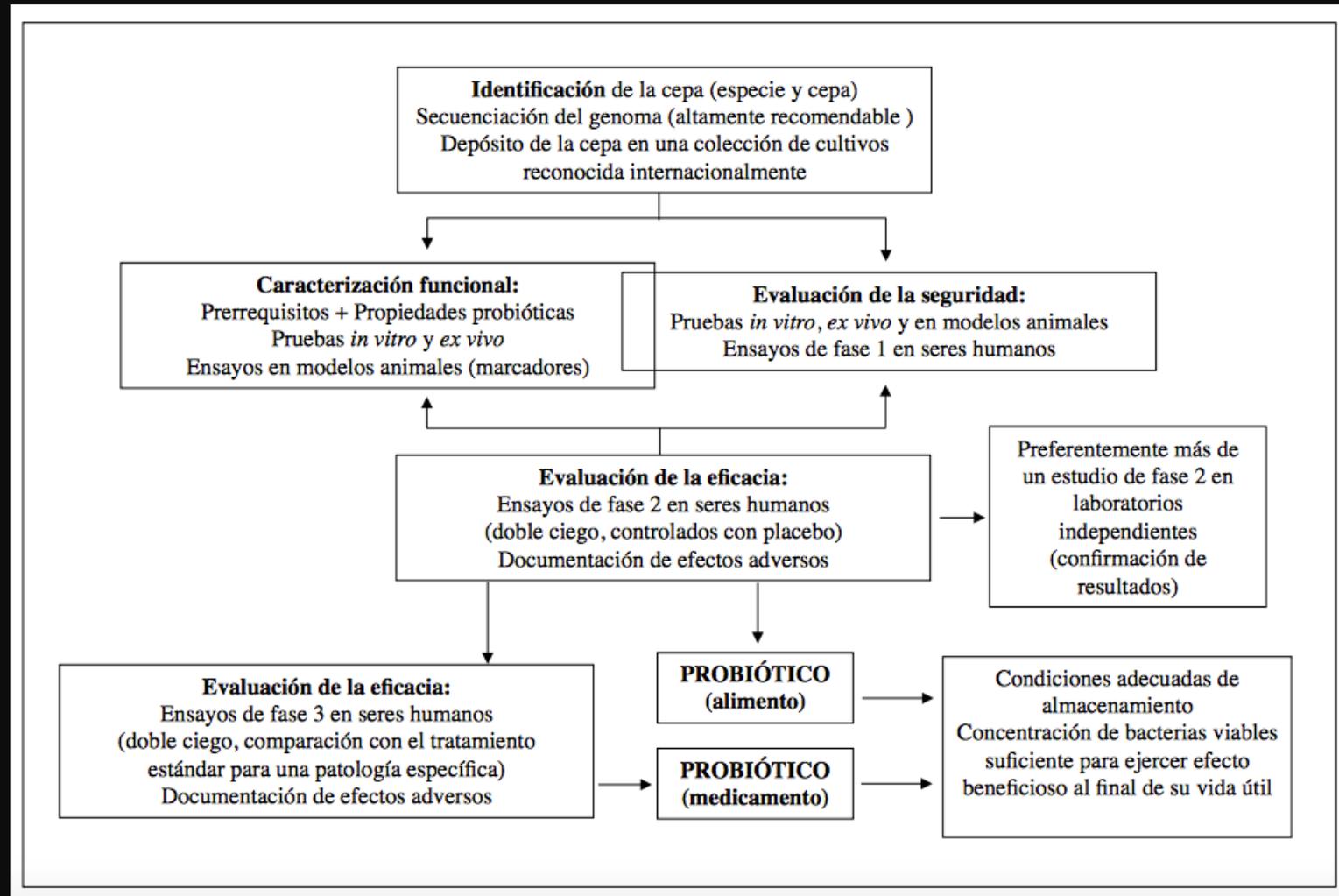
Cada cucharita de café son 5 gr. de azúcar



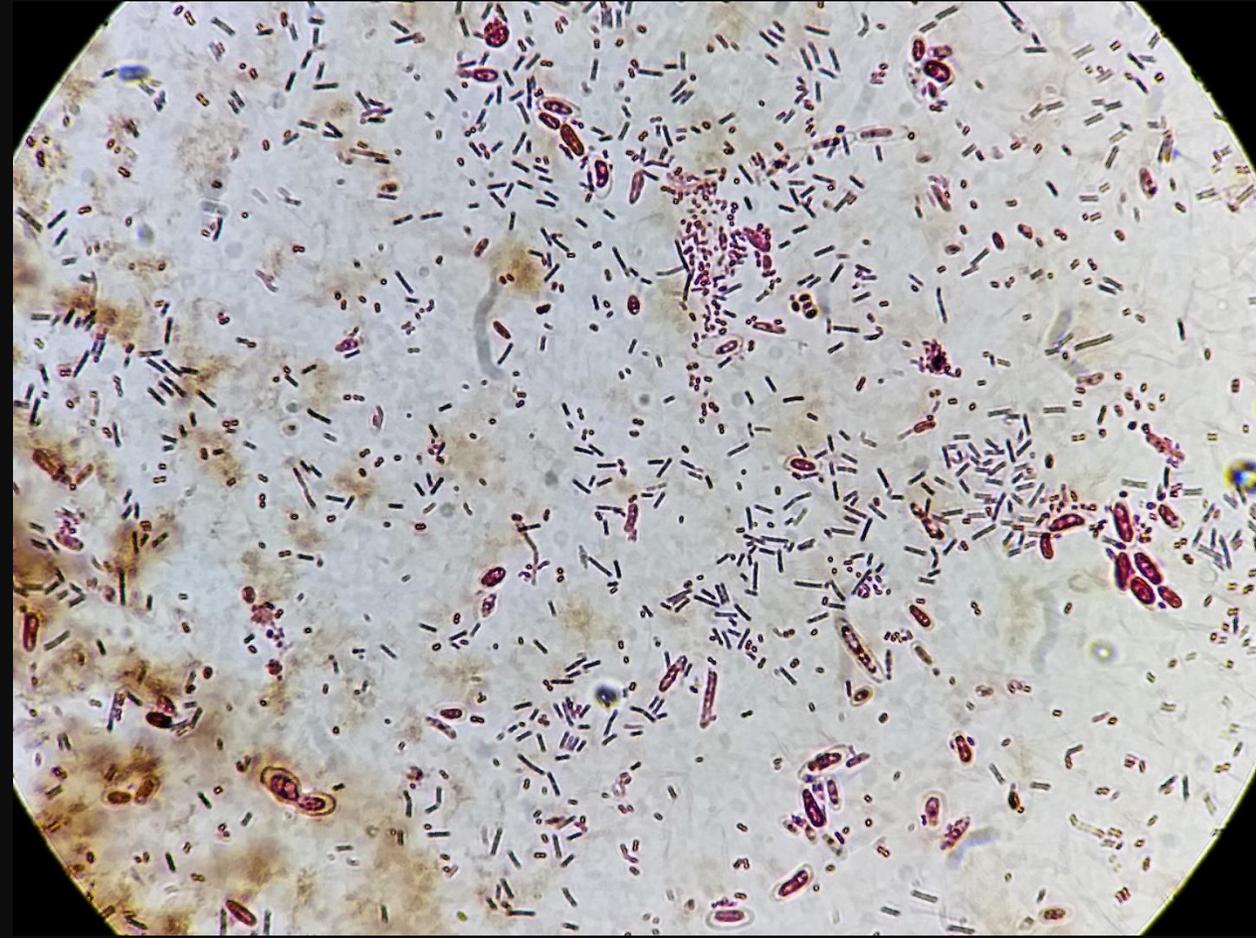
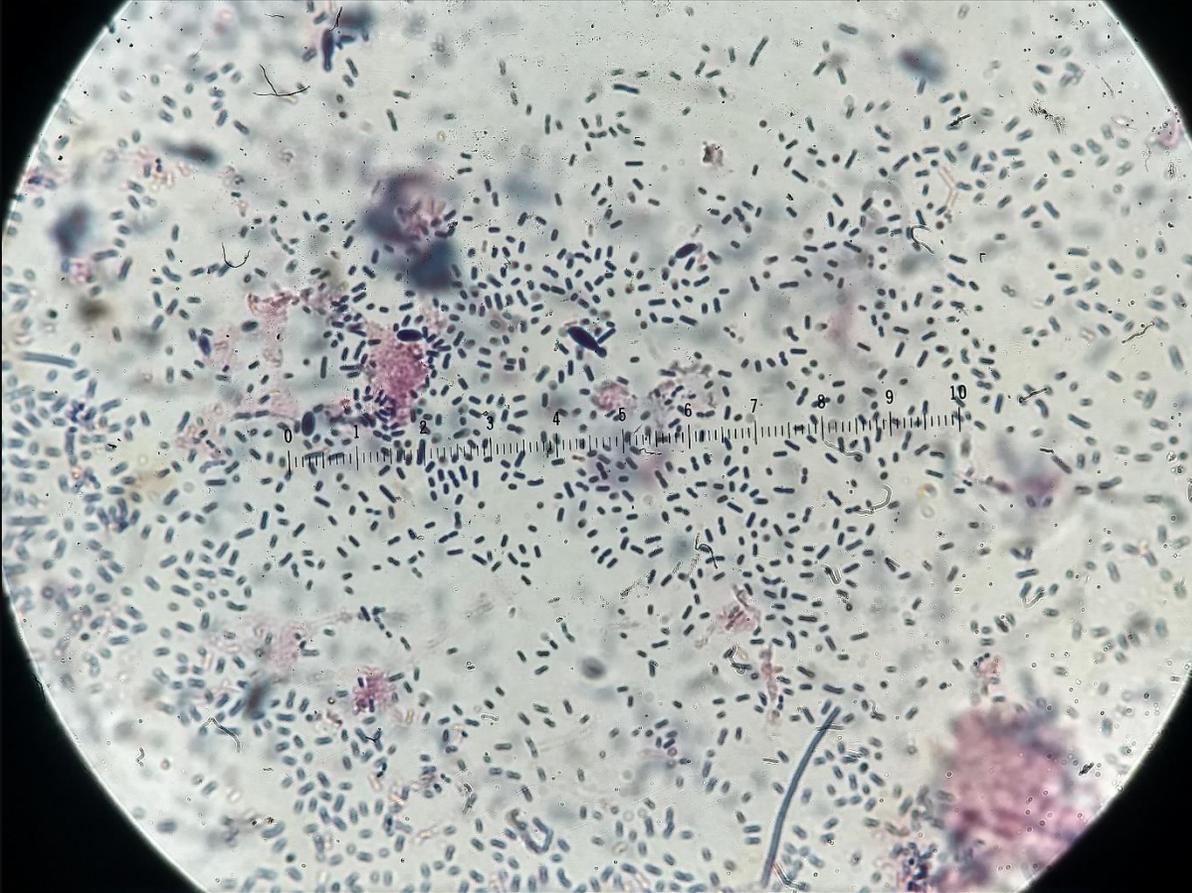
Fuente: BMJ Open. M. Vaquero /EL MUNDO GRÁFICOS

En el S. XXI

Aislamos la microbiota con nuevos criterios...



El tepache por dentro...



El futuro: entender los ecosistemas microbianos

Understanding Kombucha Tea Fermentation: A Review

Silvia Alejandra Villarreal-Soto, Sandra Beaufort, Jalloul Bouajila , Jean-Pierre Souchard, and Patricia Taillandier

Abstract: Kombucha is a beverage of probable Manchurian origins obtained from fermented tea by a microbial consortium composed of several bacteria and yeasts. This mixed consortium forms a powerful symbiosis capable of inhibiting the growth of potentially contaminating bacteria. The fermentation process also leads to the formation of a polymeric cellulose pellicle due to the activity of certain strains of *Acetobacter sp.* The tea fermentation process by the microbial consortium was able to show an increase in certain biological activities which have been already studied; however, little information is available on the characterization of its active components and their evolution during fermentation. Studies have also reported that the use of infusions from other plants may be a promising alternative.

Keywords: bioactivity, fermentation, kombucha tea, microbial cellulose, symbiosis

Practical Application: Kombucha is a traditional fermented tea whose consumption has increased in the recent years due to its multiple functional properties such as anti-inflammatory potential and antioxidant activity. The microbiological composition of this beverage is quite complex and still more research is needed in order to fully understand its behavior. This study comprises the chemical and microbiological composition of the tea and the main factors that affect its production.

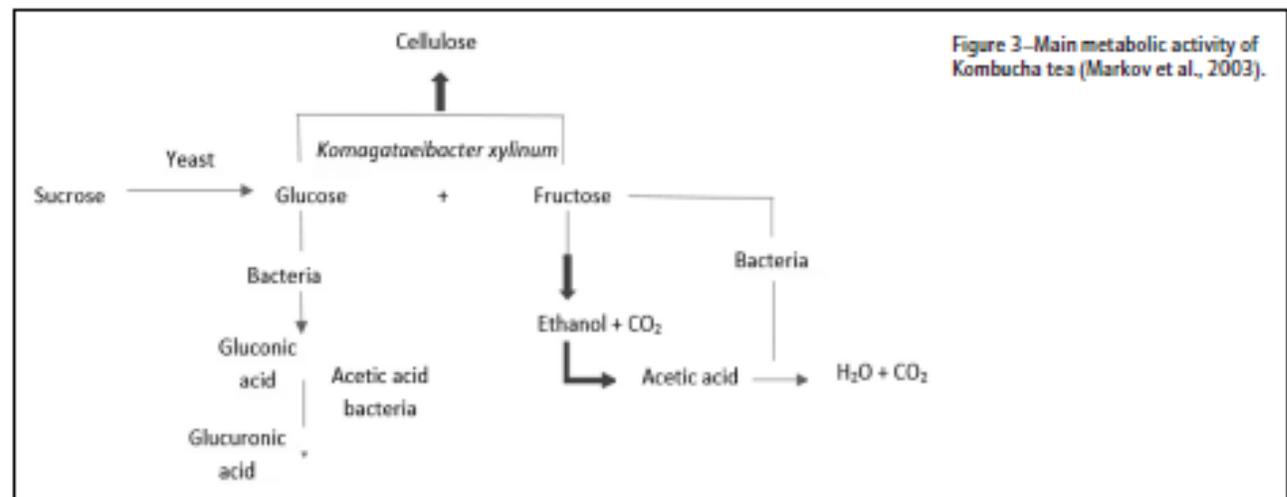


Figure 3—Main metabolic activity of Kombucha tea (Markov et al., 2003).

Lo que estamos aprendiendo...

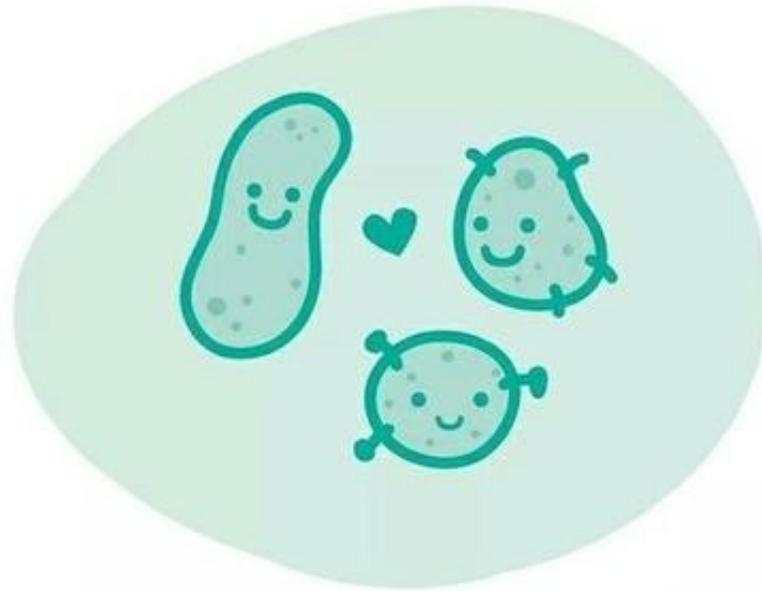
- Los microorganismos **son inteligentes**
- **Son supervivientes:** se adaptan, se juntan, cambian, mutan, se comunican,...
- **Los necesitamos:** necesitamos que haya muchos, que sean variados y que exista un equilibrio entre ellos y con nosotros
- Todos cumplen funciones importantes (que no conocemos)
- **La respuesta está en el equilibrio**



Se cae la vida cuando no hay equilibrio

Ana Tijoux

CUANDO TE SIENTAS SOLO. . .



RECUERDA QUE HAY MILLONES DE BACTERIAS QUE VIVEN EN TU CUERPO Y QUE SIGNIFICAS EL MUNDO PARA ELLAS