



In Pursuit of The Human

Post Planetary Design
Final Presentation Pecha Kucha

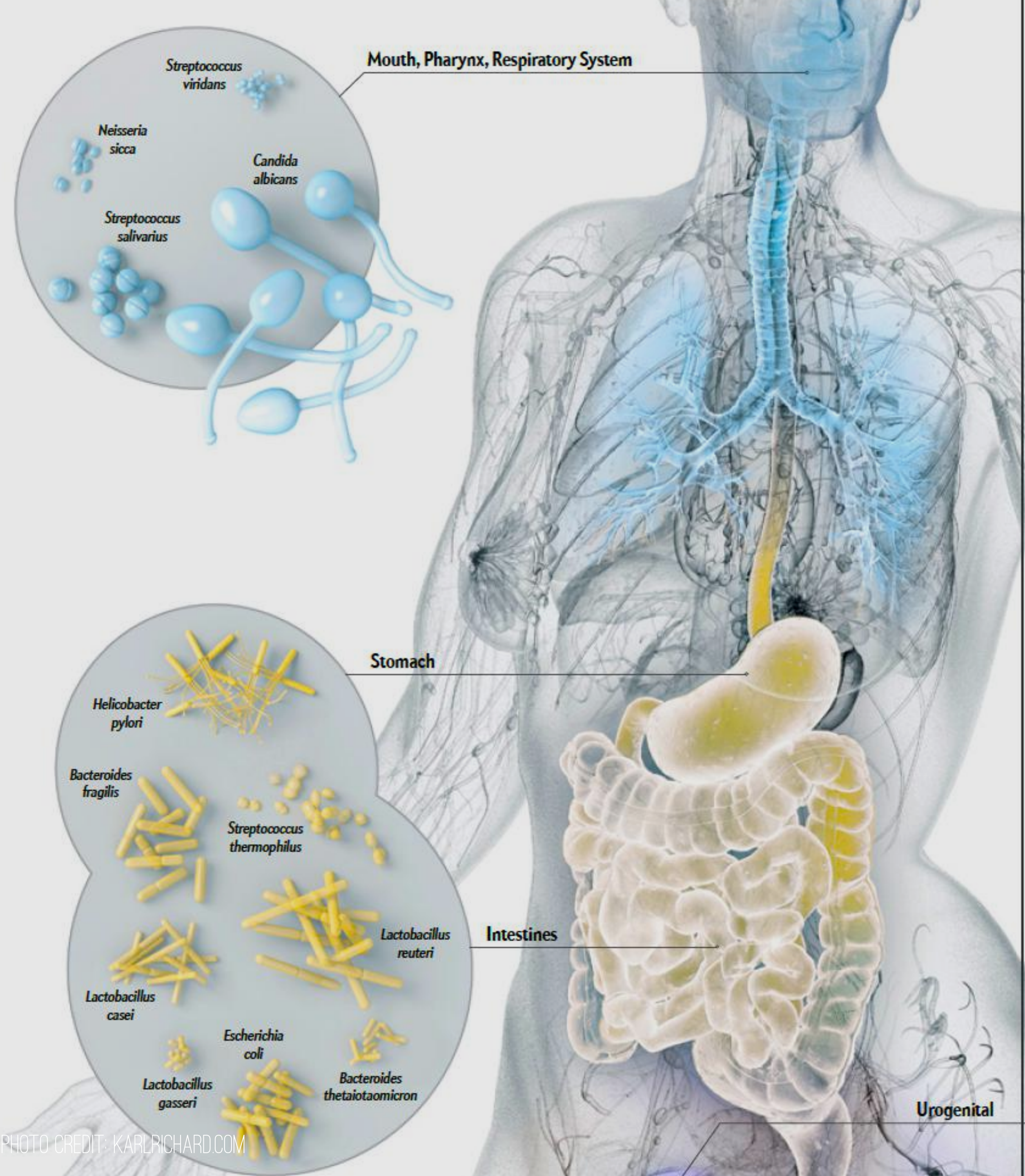
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[STATEMENT OF PROBLEM]

- >> In the future, what human designs should make it off-planet?
- >> What version of the human should we take with us into the vast cosmos?

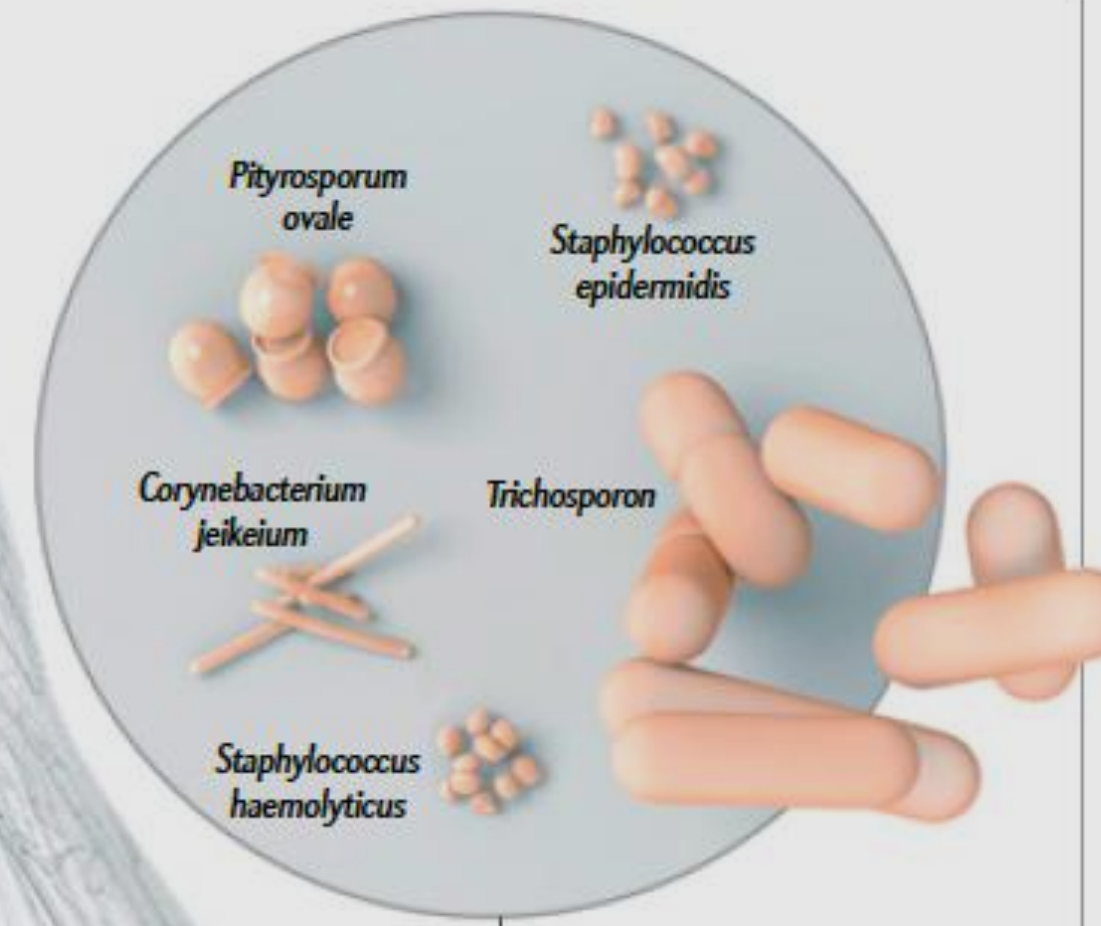
>> But what is *the human*?

>> Do we fully understand *the human*?

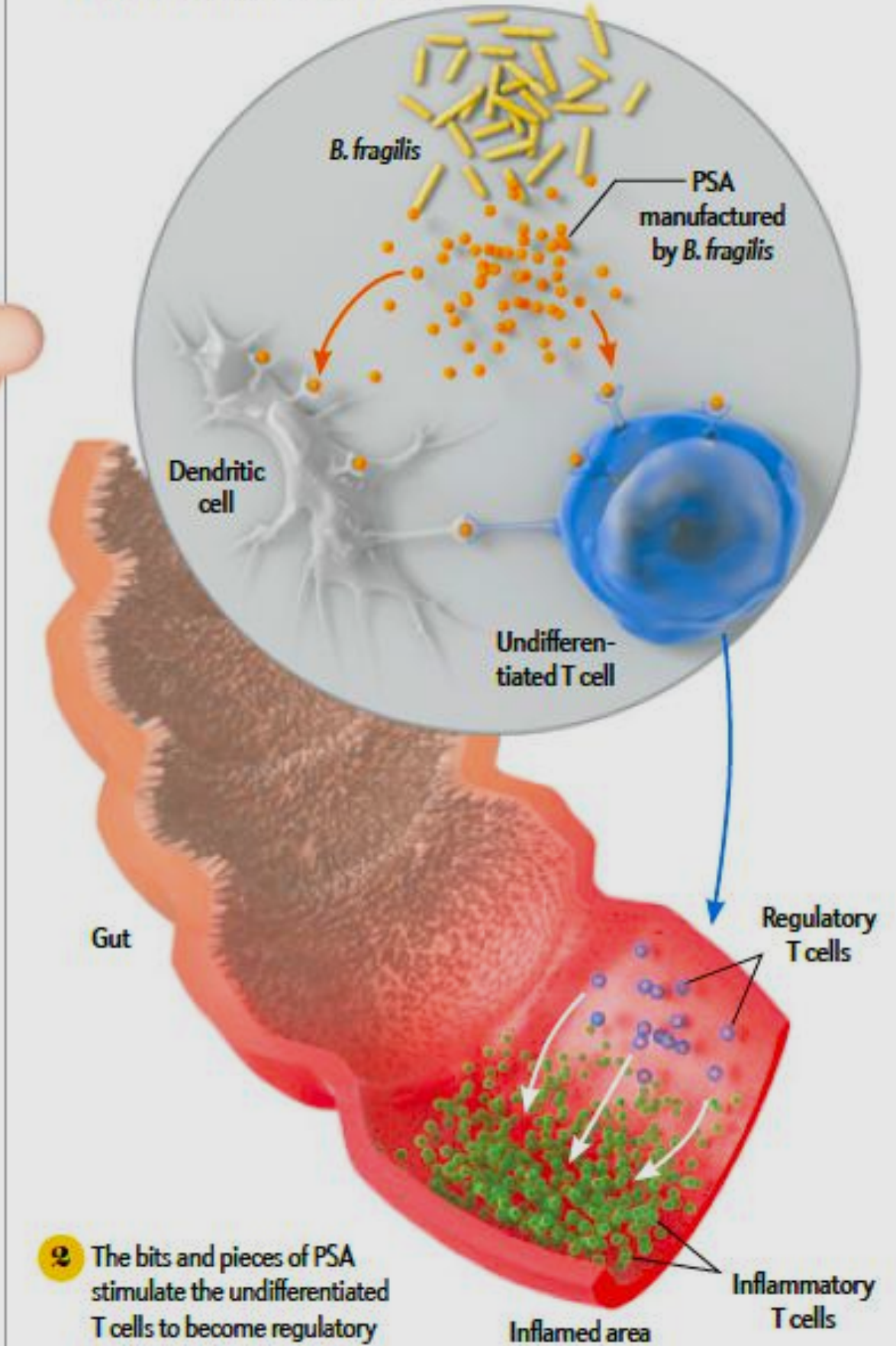


Different Species for Different Reasons

Various types of microbes congregate everywhere in and on the human body. Their presence maintains their host's health in part by making it hard for disease-causing germs to gain access to the body. Several species, such as *Bacteroides fragilis*, also perform specific useful functions, including aiding in the development and regulation of the immune system (below, right).



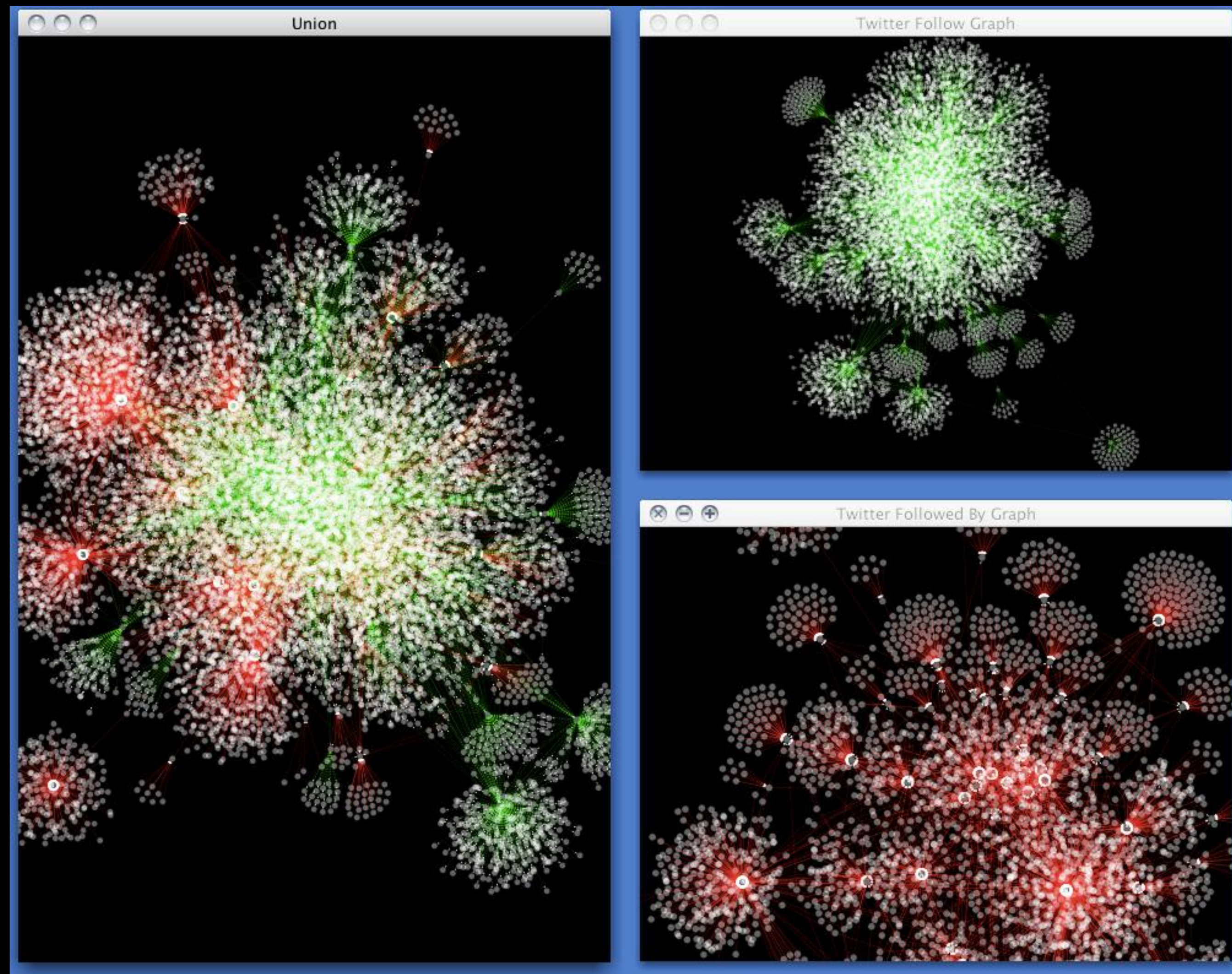
- 1 Immune cells called dendritic cells pick up a molecule called polysaccharide A (PSA) from the *B. fragilis* cells and present it to undifferentiated T cells.



- 2 The bits and pieces of PSA stimulate the undifferentiated T cells to become regulatory T cells, which in turn produce substances that tamp down the aggressive efforts of inflammatory T cells.

Case Study: How One Bacterial Species Helps

Studies on mice raised in sterile conditions reveal that *B. fragilis* bacteria are crucial to maintaining the health of the intestines. In one experiment, germ-free mice that were given a strain of *B. fragilis* bacteria that produced the complex carbohydrate



Ho.lo.bi.ont

adjective

A biomolecular network composed of the host plus its associated microbes, e.g. humans, animals, or plants. As such, their collective genomes forge a “hologenome.”



Sergey Nivens/Shutterstock.com

Humans can be identified by the unique 'microbial cloud' that surrounds them

It's made of farts and skin bacteria.

BEC CREW 23 SEP 2015



8.0k



Science News

from research organizations

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Cities have individual microbial signatures

Date: April 19, 2016

Source: American Society for Microbiology

Summary: Cities have their own distinct microbial communities but these communities don't vary much between offices located in the same city, according to a new study. The work offers insight into what drives the composition of microbes in built environments.

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Feb. 3, 2016 — New research provides new insight into one of the world's most diverse and extensive ecosystems of living microbes. The study offers a new perspective on the growth and structure of rare, ...

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Nov. 5, 2015 — Scientists studying microbiomes have created a framework for predicting how the composition of these complex microbial communities may respond to changing ...

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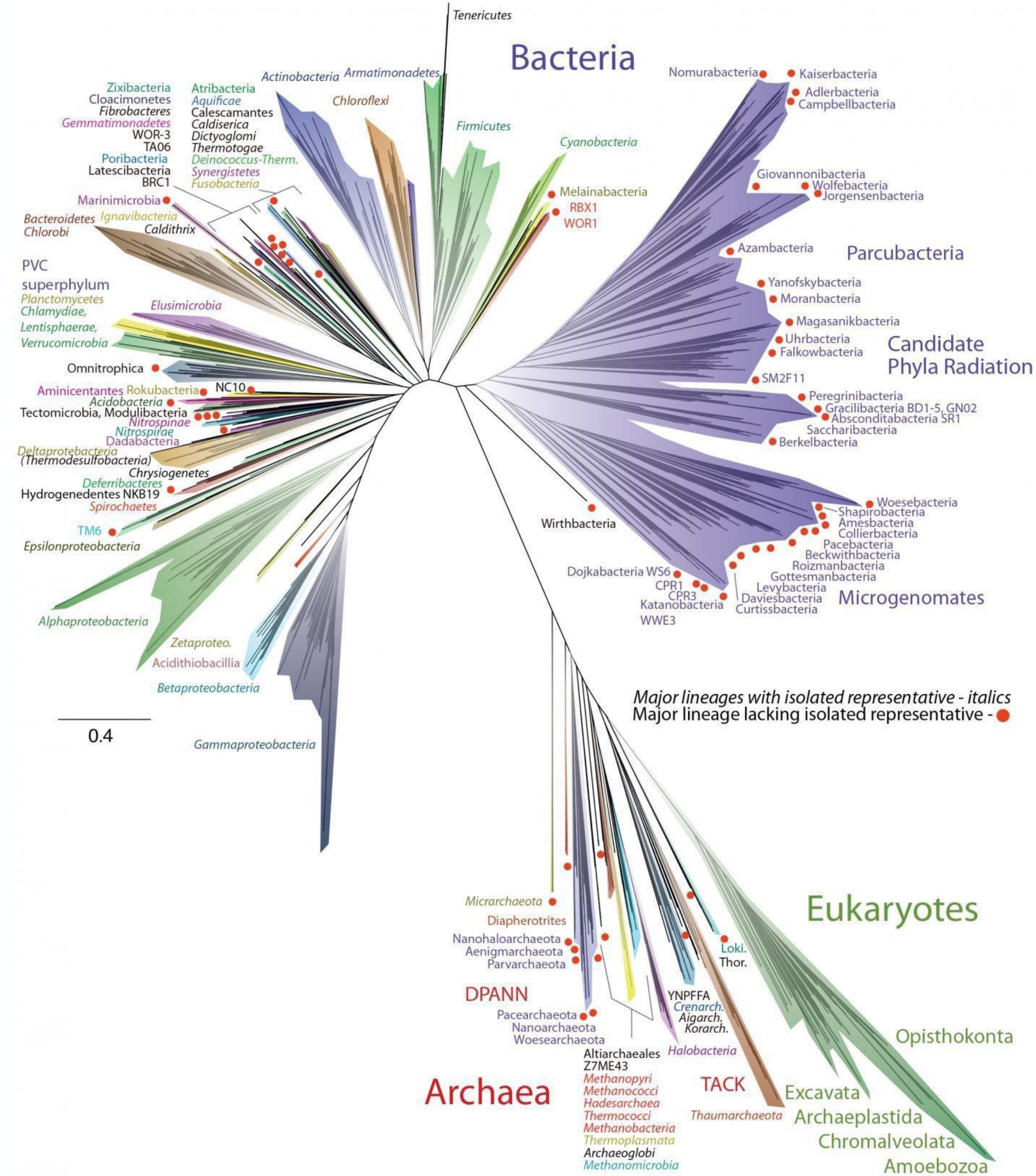
Microbial 'Signature' for Sexual Crimes

Dec. 15, 2014 — In the first study of hair microbiota for forensics, researchers found in their preliminary results that pubic hairs in particular show the most potential for

Scientists Unveil New ‘Tree of Life’

By CARL ZIMMER APRIL 11, 2016

“The results [of this new tree] reveal the dominance of bacterial diversification...”



[THINKING ACROSS SCALES]

THE BIG BANG

INFLATION

GALAXY EVOLUTION
CONTINUES...

DARK ENERGY?

FIRST STARS
400,000,000 YEARS
AFTER BIG BANG

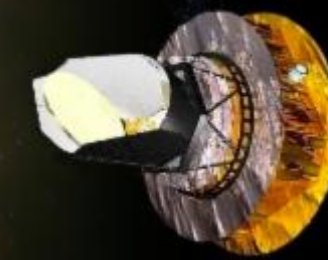
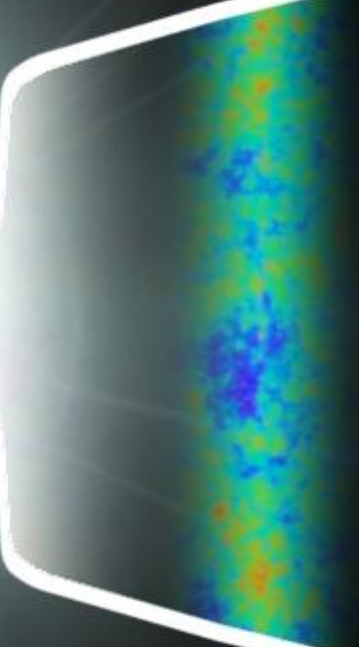
THE DARK AGES

COSMIC MICROWAVE
BACKGROUND
400,000 YEARS AFTER
BIG BANG

FIRST GALAXIES
1 000,000,000 YEARS
AFTER BIG BANG

FORMATION OF
THE SOLAR SYSTEM
8,700,000,000 YEARS
AFTER BIG BANG

Now
13,700,000,000 YEARS
AFTER BIG BANG





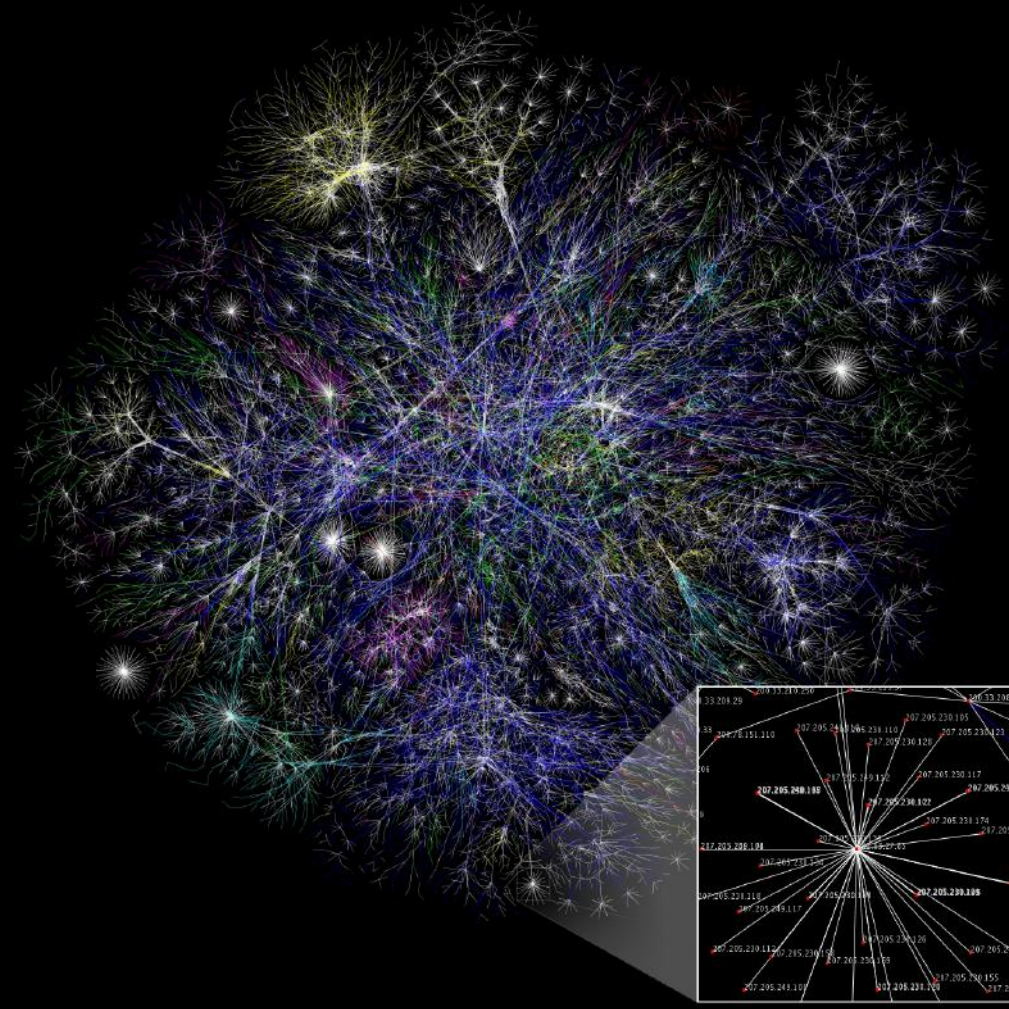
4.5 Billion



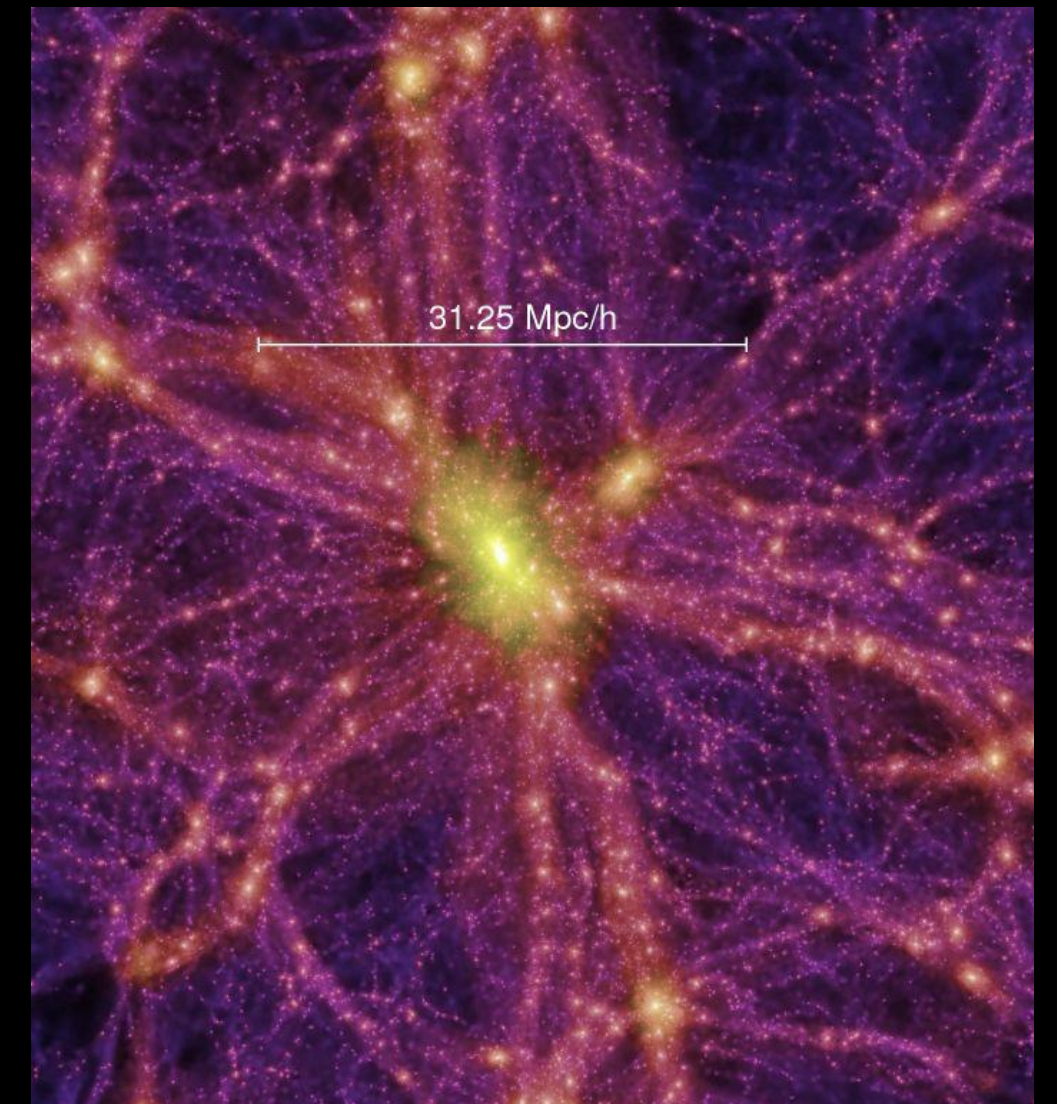
200,000

>> Are there isomorphisms
across vast scales that
have implications on what
the human is?

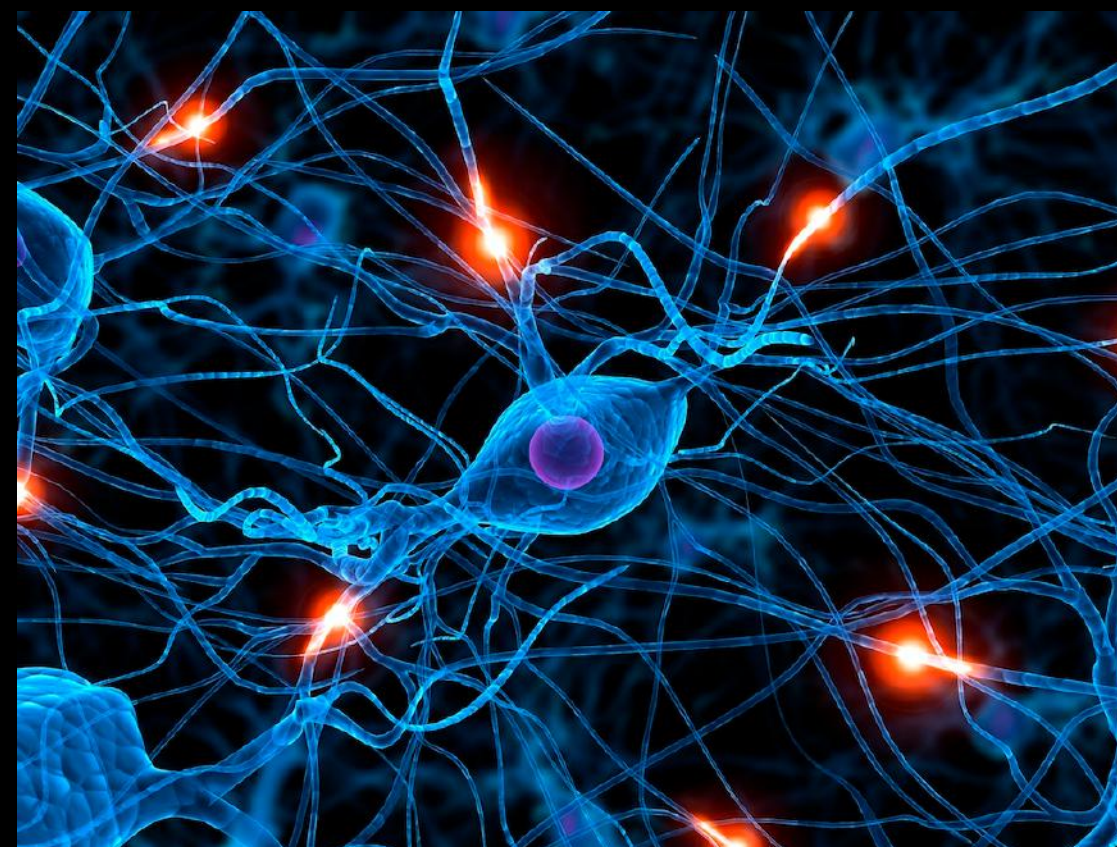
technology web



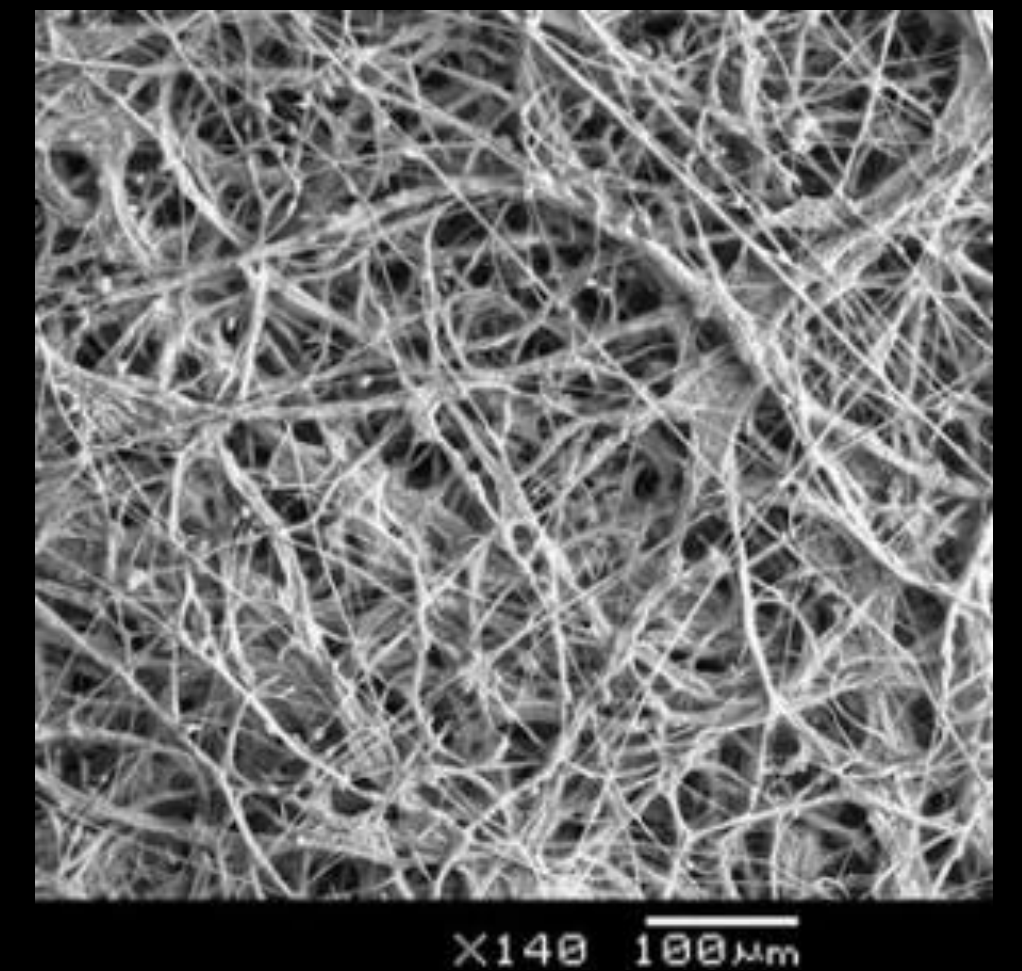
cosmic web



neural brain web



mycelium web



IPv6 = $(7 \times 10^4)(10.8 \times 10^{23})$

“The rise of mathematical theories of communication in the middle of the 20th century made possible the emergence of planetary scale cyber infrastructure across the scale of whole continents. With the discovery of DNA we began to understand that life itself is informational. We haven’t fully grasped the implications. With the Deep Address initiative, we are ... thinking across such scales at once, from the intercontinental and the intercellular, if you like. Universal addressing platforms, like IPv6, are one way that the real movement of information between scales can be conceptualized and diagrammed.”

-Benjamin Bratton

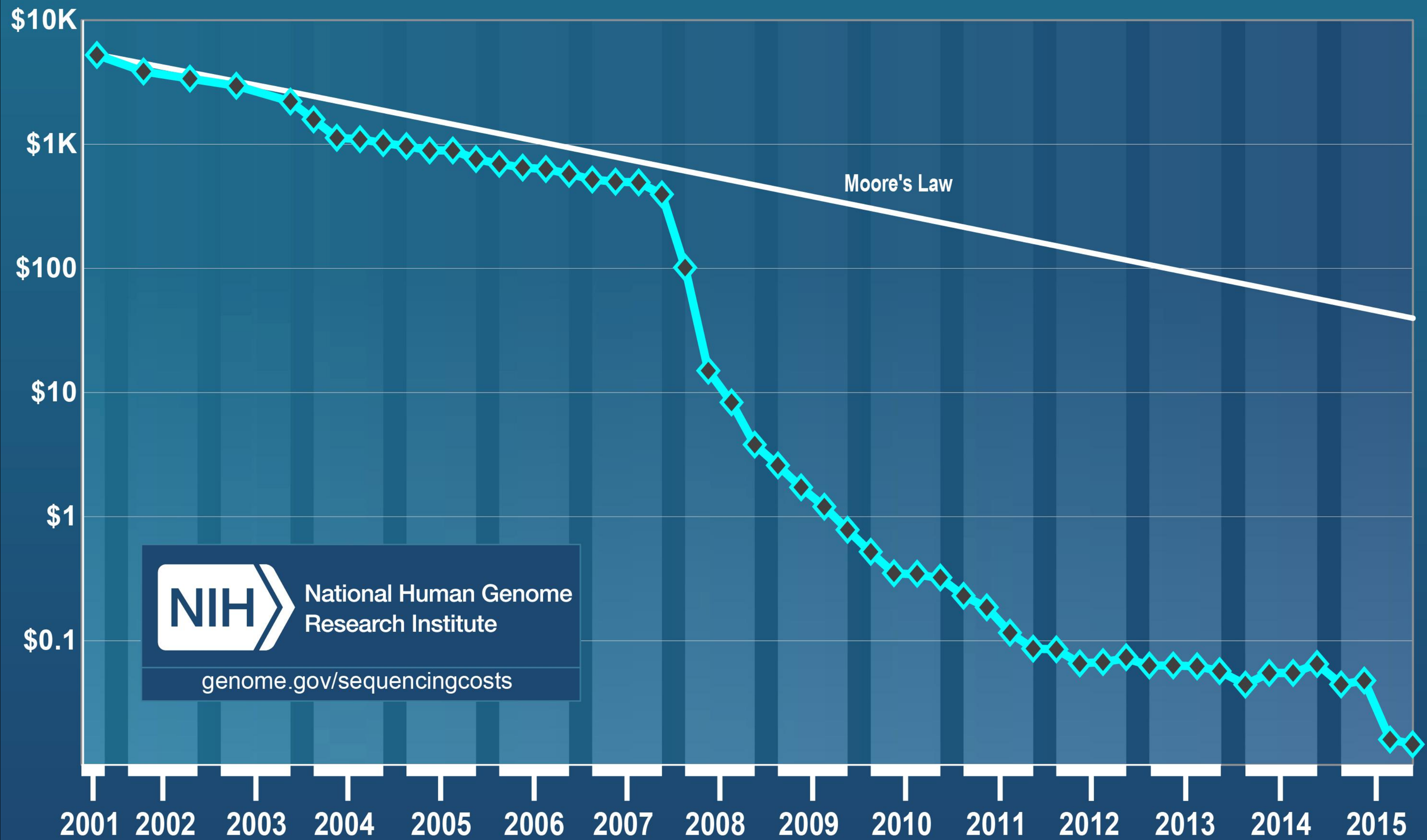
DEEP ADDRESS

>> Are our own technologies metaphors to help us understand morphology across scales, “from star, to planet, to crystal to microbe”? Are are they actual maps?

Phylogenetic Map of Fort Greene, Brooklyn

[KNOW THYSELF]

Cost per Raw Megabase of DNA Sequence



New! Barcode 96 samples We have released a PCR Barcoding Kit. 96 barcodes, 10 reactions of each. Community members please join our online barcoding event on 12 May.

[Read more](#)

What could MinION do for you?

MinION is being used for pathogen surveillance, metagenomics, variant detection, selective sequencing and much more

[Start using MinION](#) ➤

[Read publications](#) ➤

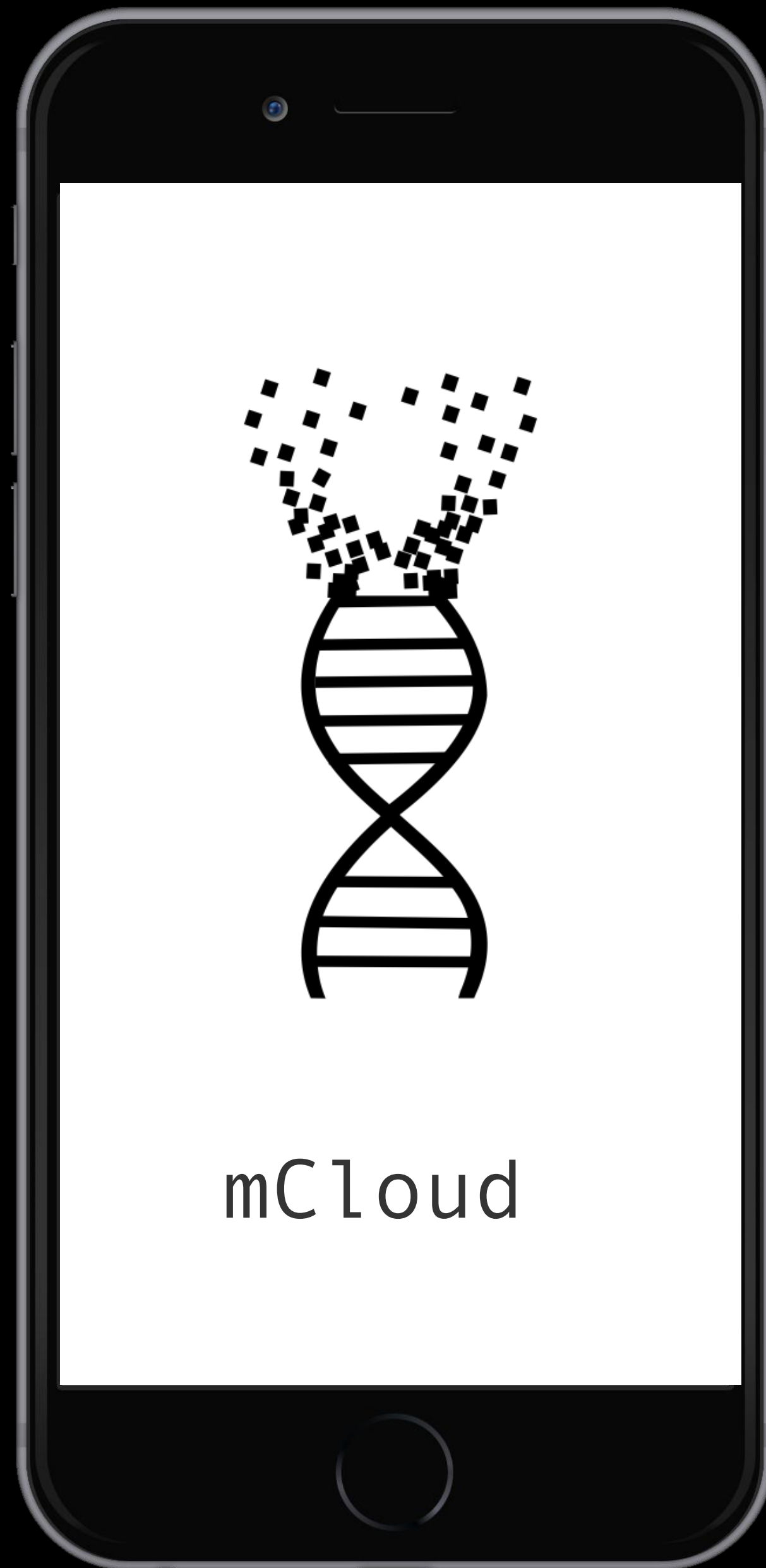
DNA Sequencing with MinION: what does it offer?

Scalability



The MinION can be run for minutes or days according to the experimental need. Users can adjust settings like the speed that the DNA passes through the nanopore. PromethION, which will soon be released into early access, is designed to be fully scalable so that users can operate between one or 48 flow cells at any one time.





An application for human identification using airborne microbial cloud readings.

>> Embedded microbe sensor

>> Using Nanopore Technology for on-the-fly DNA sequencing



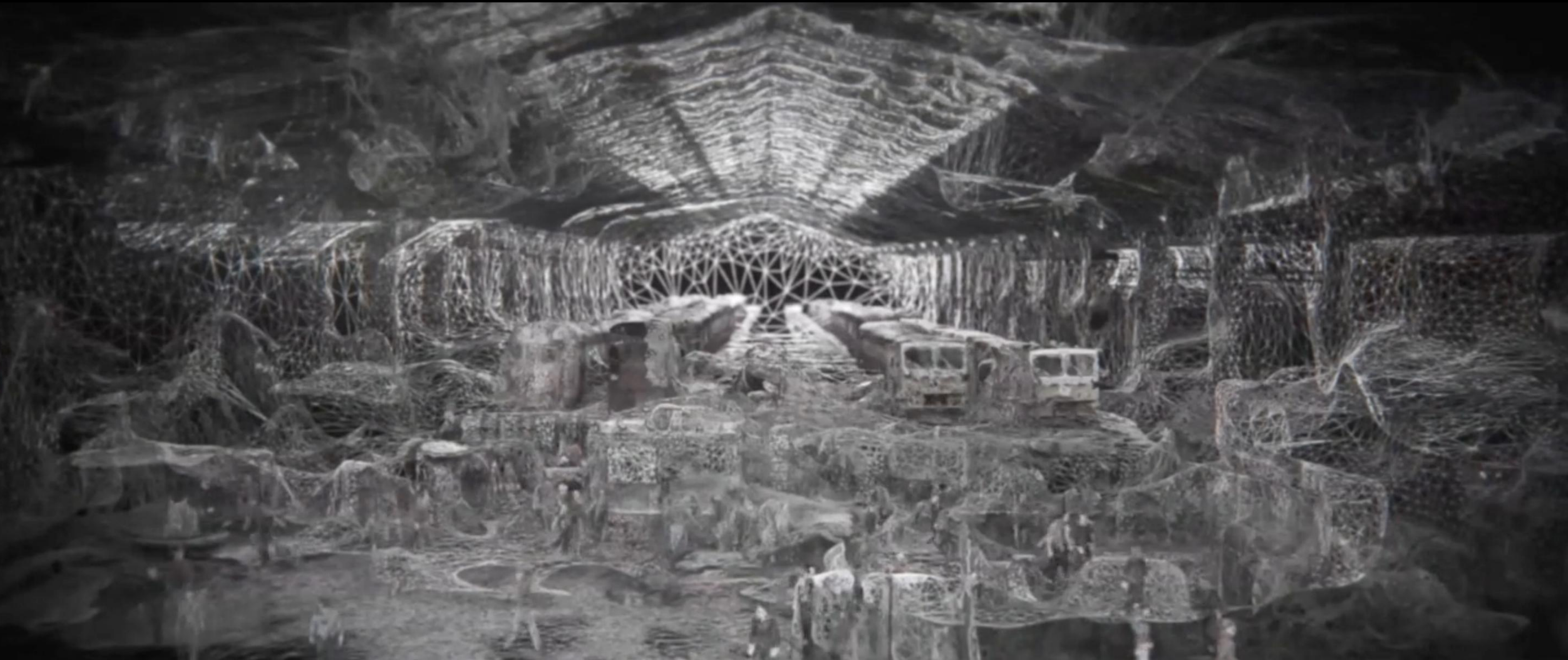
>> Once aware of the companion species that live
among us in our environment, on us, and in us,
might we begin to review what it means to be
human?

Might we begin to review our
relationship to our environments?

To see our cities as more than vast
metropolises...



..but as complex and adaptive, biological superstructures.



Before we go off planet...

Humans will need to become highly evolved; to be conscious should become synonymous with the understanding that humans are fundamentally connected to each other, to the planet Earth, and to the cosmos—biologically and energetically (Big Bang). We must recognize that the isomorphisms found in nature across scales are the keys to unlock the mysteries of our own existence. We will need to see that the planetary flora web, the mycelium-like patterns in the information architecture of the Internet, the matrices that define string theory, machine learning mathematical models, the dark matter suffusing the cosmos, are all evidence of an evolutionary “information system” governing reality itself. Humans must recognize that we *are*, like a fractal, embedded in a never ending repeating pattern of information flow—an ‘Internet of Energy’ (IoE). We must understand that we are but a node in the vast planetary, universal, mesh-network that makes up our cosmological ecology. This is what it means to be human.

THANK YOU

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