



Explorando el microbioma del ambiente construido y su relación con la actividad humana

Juan A. Ugalde

Centro de Bioinformática y Biología Integrativa

Facultad de Ciencias de la Vida

Universidad Andrés Bello

No conocemos toda la diversidad microbiana que nos rodea

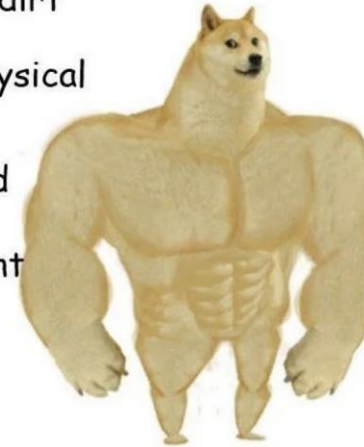


BACTERIA IN NATURE

eating literal dirt

defying the physical
limits of life

this is my third
eukaryotic
extinction event
in a row 🙌



BACTERIA IN THE LAB

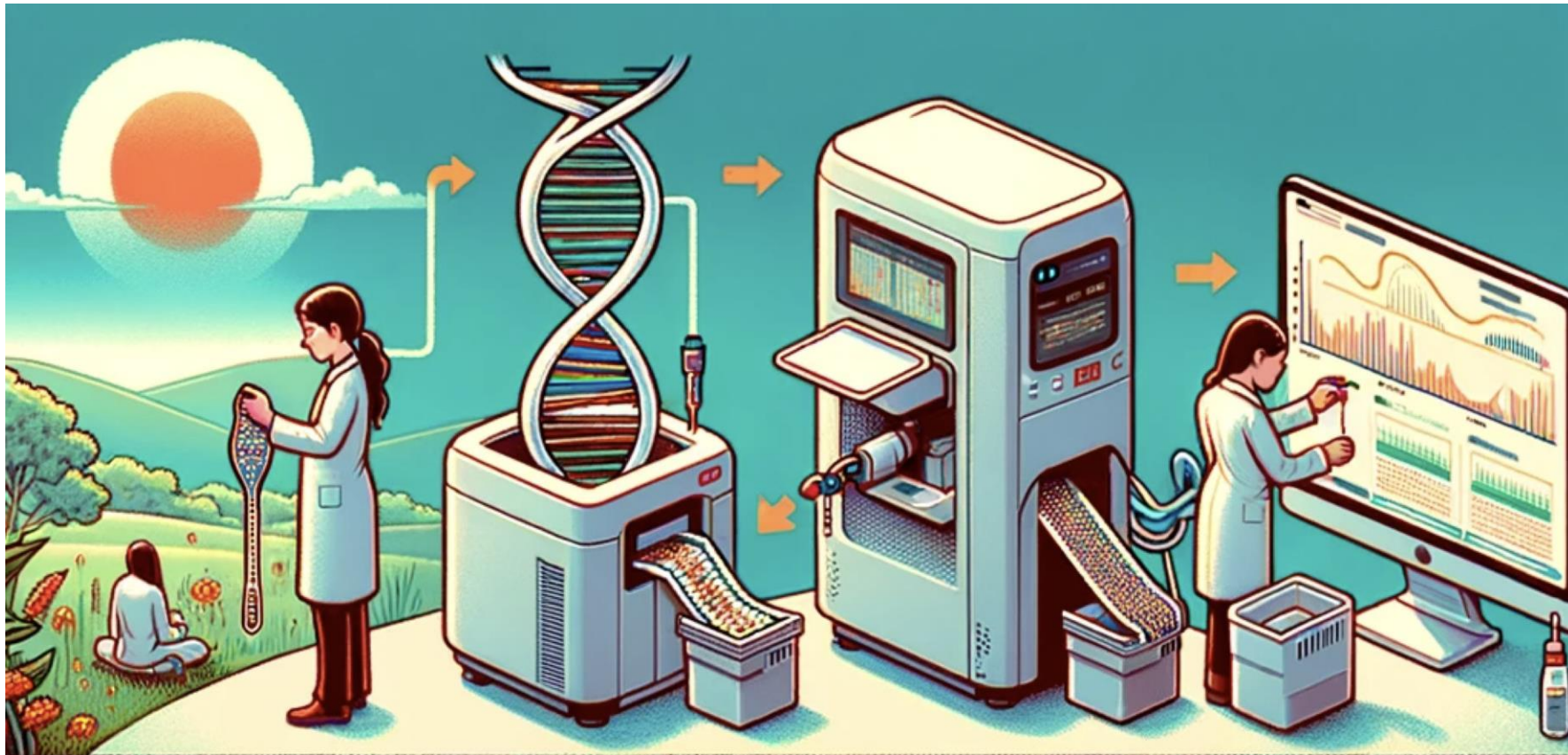
not my favourite sugar ☹️ ☹️ ☹️

the pH is off by 0.001

is this tap water? I'm allergic



El desarrollo tecnológico en secuenciación de ADN nos permite explorar la diversidad microbiana sin depender de cultivos



HOME SWEET HOME

YOUR MICROBES MOVE IN WHEN YOU DO

Each human is an ecosystem of millions and millions of microbes. As it turns out, they make themselves right at home in our houses, too, everywhere from bathroom tiles to TV screens.

"To microbes, the diversity of places to live in a home must be enormous," Curators Rob DeSalle and Susan Perkins note in their new book, *Welcome to the Microbiome*.

Many factors can influence the microbiome of a home, including temperature, humidity, and the individuals who spend time there. "If you let people use a room after it has been sterilized, within an hour you'll find 500,000 cells per square inch of surface," says Jack Gilbert, a researcher at Argonne National Laboratory and principal investigator for the Home Microbiome Project.

LIVING AND DINING ROOMS

Because we're constantly shedding microbes, entertaining visitors can transform the microbiome of your home. "Sitting in a living room, people will leave behind a distinct, microbial signature in just half an hour," says Gilbert.

GARDEN

The world just outside your door is teeming with life you can't see, even more so than your home. Researchers estimate there are up to 38,000 different types of microbes in just a single gram of soil.

THE SECRET WORLD
INSIDE YOU
OPEN NOW AND
FREE FOR MEMBERS



The spots marked with this icon tend to be among the most species-rich spaces in a house.

BEDROOM

Kitchens and bathrooms get cleaned frequently, and living rooms host all manner of guests. Since bedrooms typically host just one or two people, they are excellent indicators of the microbiomes of those individuals.

KITCHEN

The microbial populations of your home are shaped by cleaning. Objects that get cleaned frequently—like your cutting board or countertop—are less diverse than places you're not washing as often. Some of the most biologically diverse surfaces in kitchens? Exhaust fans over the oven.

DOGS

The microbes on Rover's skin and fur are just as diverse as those that live on you, and maybe even more, so it's not surprising that homes with pet dogs have microbiomes that are more diverse than those without them.

DOORWAY

The frames around the inside and outside of your front door rest just inches from one another. It's a very important couple of inches, though. A 2013 study in the journal *PLOS ONE* found that outdoor door trims, exposed to the elements, hosted microbial communities that were more similar to those found in soil and leaves.

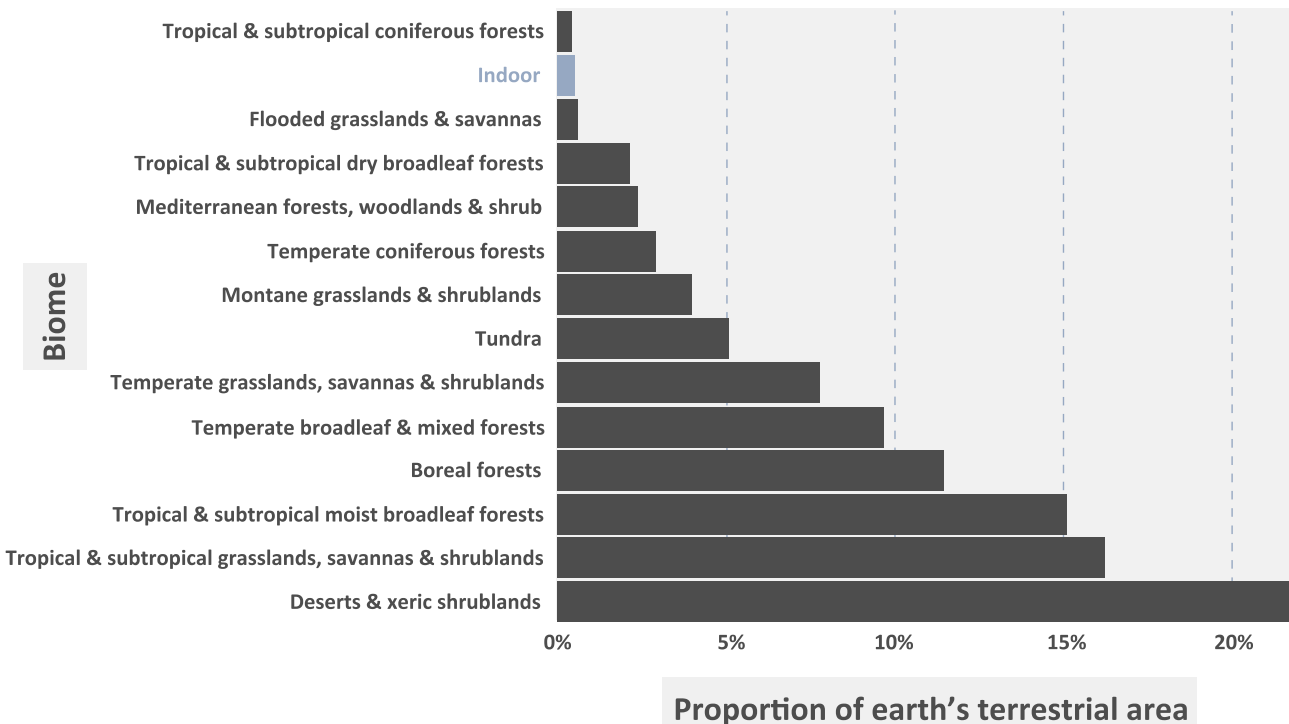
BATHROOM

Microbial populations can have unexpected things in common. The microbiome of your toilet seat, for instance, is most similar to another household object that touches your skin a lot—your pillowcase. Sleep tight!

TO LEARN MORE ABOUT MICROBIOLOGY,
VISIT OLOGY, THE MUSEUM'S SCIENCE SITE
FOR KIDS, AT bit.ly/Microbiology

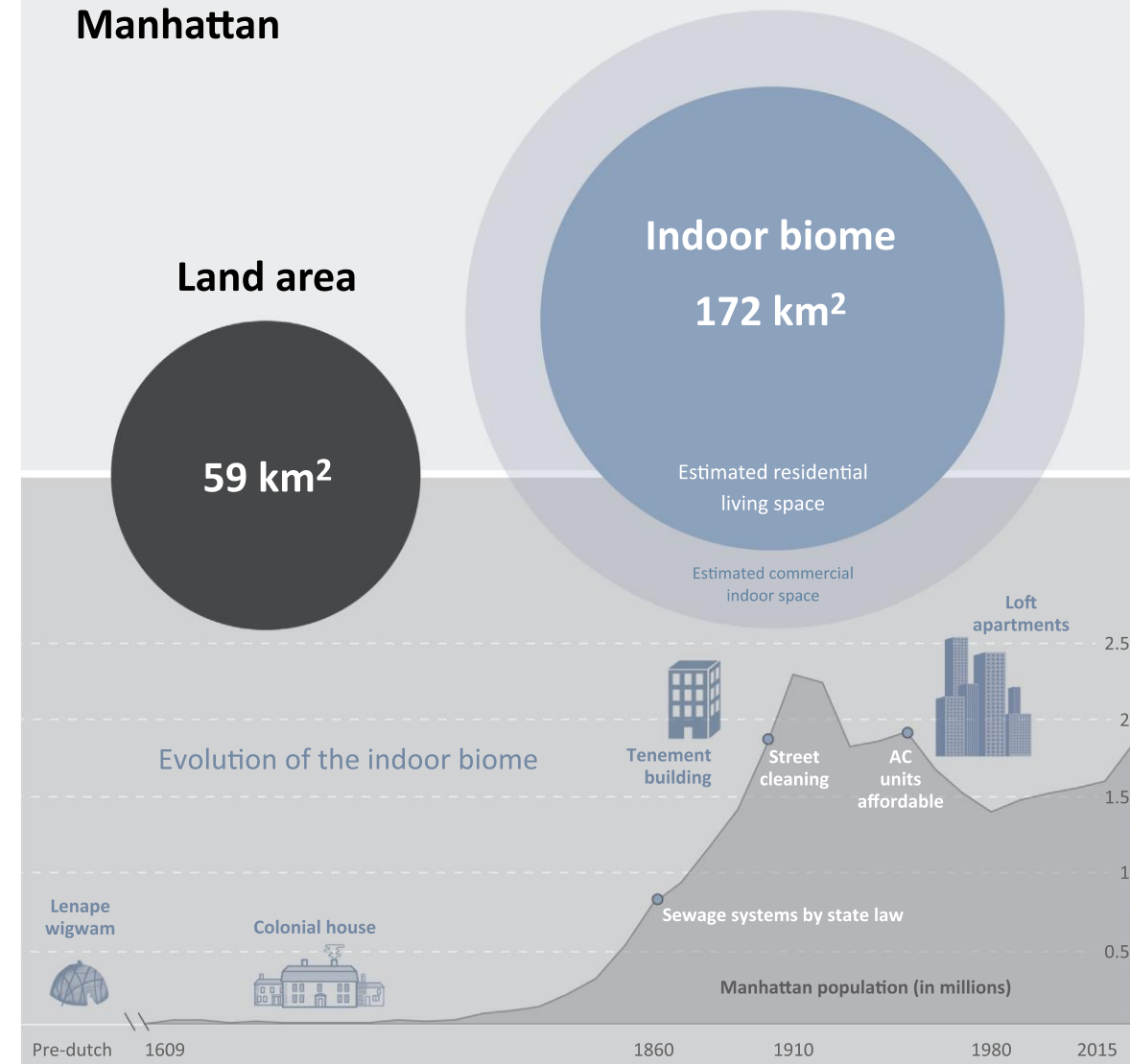
Evolution of the indoor biome

NESCent Working Group on the Evolutionary Biology of the Built Environment, Laura J. Martin¹, Rachel I. Adams², Ashley Bateman³, Holly M. Bik⁴, John Hawks⁵, Sarah M. Hird⁴, David Hughes⁶, Steven W. Kembel⁷, Kerry Kinney⁸, Sergios-Orestis Kolokotronis⁹, Gabriel Levy¹⁰, Craig McClain¹¹, James F. Meadow¹², Raul F. Medina¹³, Gwynne Mhuireach¹⁴, Corrie S. Moreau¹⁵, Jason Munshi-South^{9,16}, Lauren M. Nichols¹⁷, Clare Palmer¹⁸, Laura Popova¹⁹, Coby Schal^{17,20}, Martin Täubel²¹, Michelle Trautwein²², Juan A. Ugalde²³, and Robert R. Dunn^{17,24}



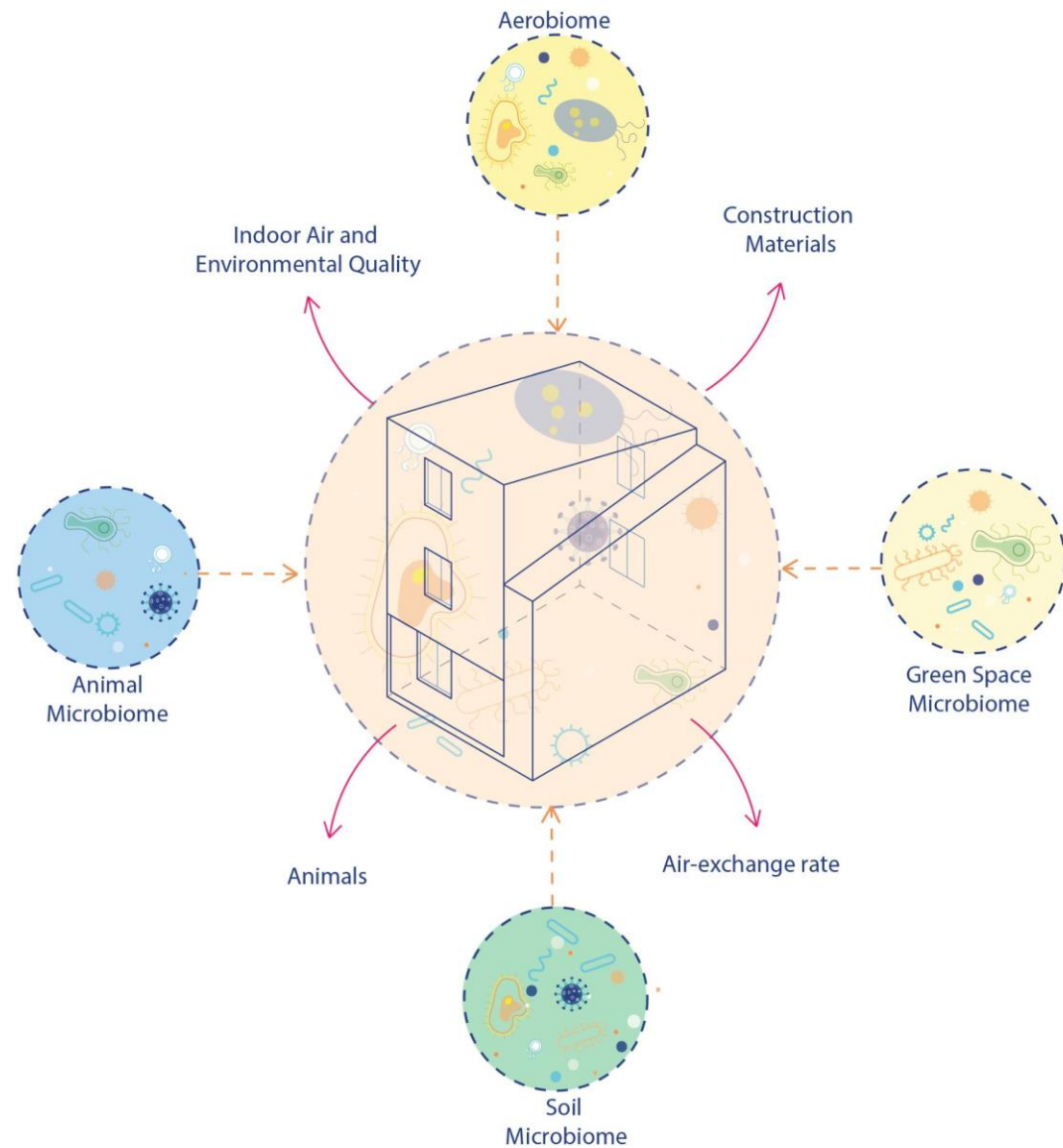
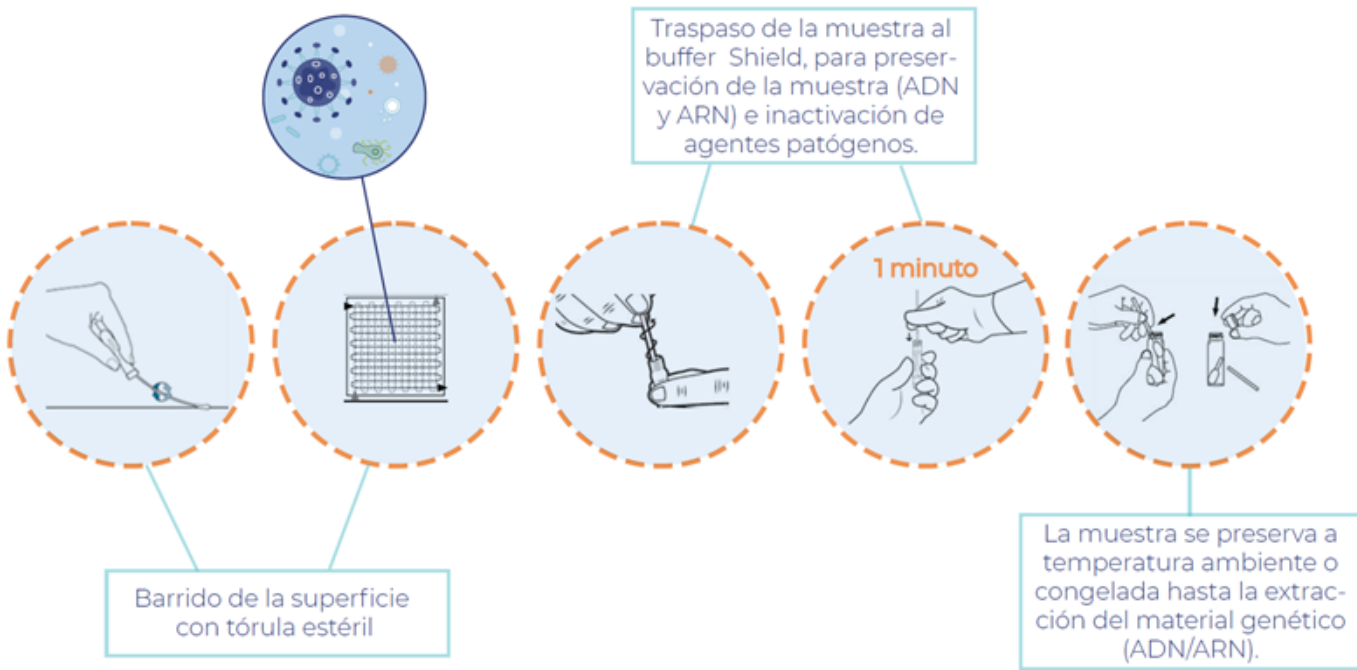
TRENDS in Ecology & Evolution

Manhattan



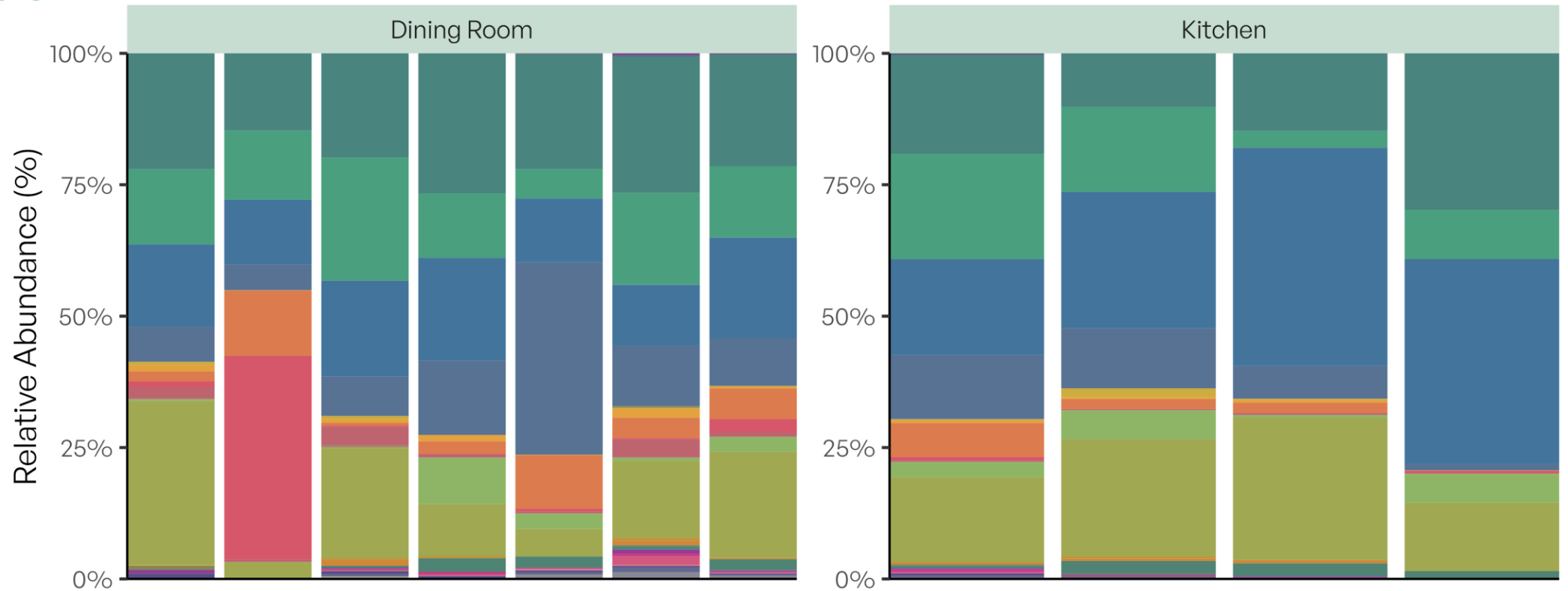
TRENDS in Ecology & Evolution

Estudio Piloto, Conjunto de Viviendas Región Metropolitana



Freed, Soto-Liebe *et al.* En preparación

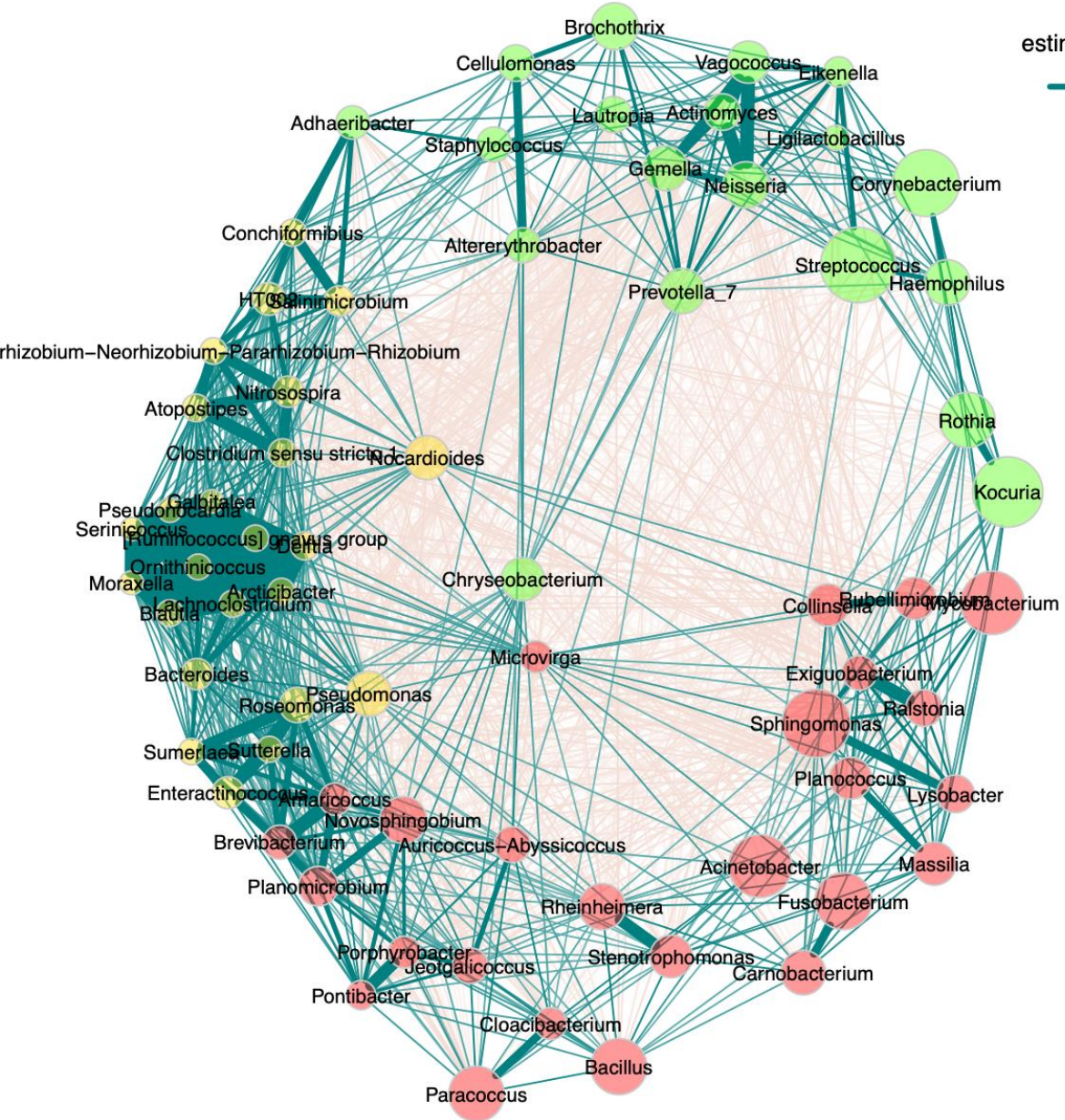
Diferencias en la composición microbiana en diferentes espacios



- | | | | | | |
|-------|---|---|---|---|---|
| Class | <ul style="list-style-type: none"> <i>Acidimicrobiia</i> <i>Acidobacteriae</i> <i>Actinobacteria</i> <i>Alphaproteobacteria</i> <i>Anaerolineae</i> <i>Bacilli</i> <i>Bacteroidia</i> | <ul style="list-style-type: none"> <i>Blastocatellia</i> <i>Campylobacteria</i> <i>Chloroflexia</i> <i>Clostridia</i> <i>Coriobacteriia</i> <i>Deinococci</i> <i>Fibrobacteria</i> | <ul style="list-style-type: none"> <i>Fusobacteriia</i> <i>Gammaproteobacteria</i> <i>Gemmatimonadetes</i> <i>Longimicrobia</i> <i>Myxococcia</i> <i>Negativicutes</i> <i>Nitrososphaeria</i> | <ul style="list-style-type: none"> <i>Oligoflexia</i> <i>Phycisphaerae</i> <i>Planctomycetes</i> <i>Polyangia</i> <i>Rhodothermia</i> <i>Rubrobacteria</i> <i>Spirochaetia</i> | <ul style="list-style-type: none"> <i>Sumerlaeia</i> <i>Thermoleophilia</i> <i>Verrucomicrobiae</i> <i>Vicinamibacteria</i> |
|-------|---|---|---|---|---|



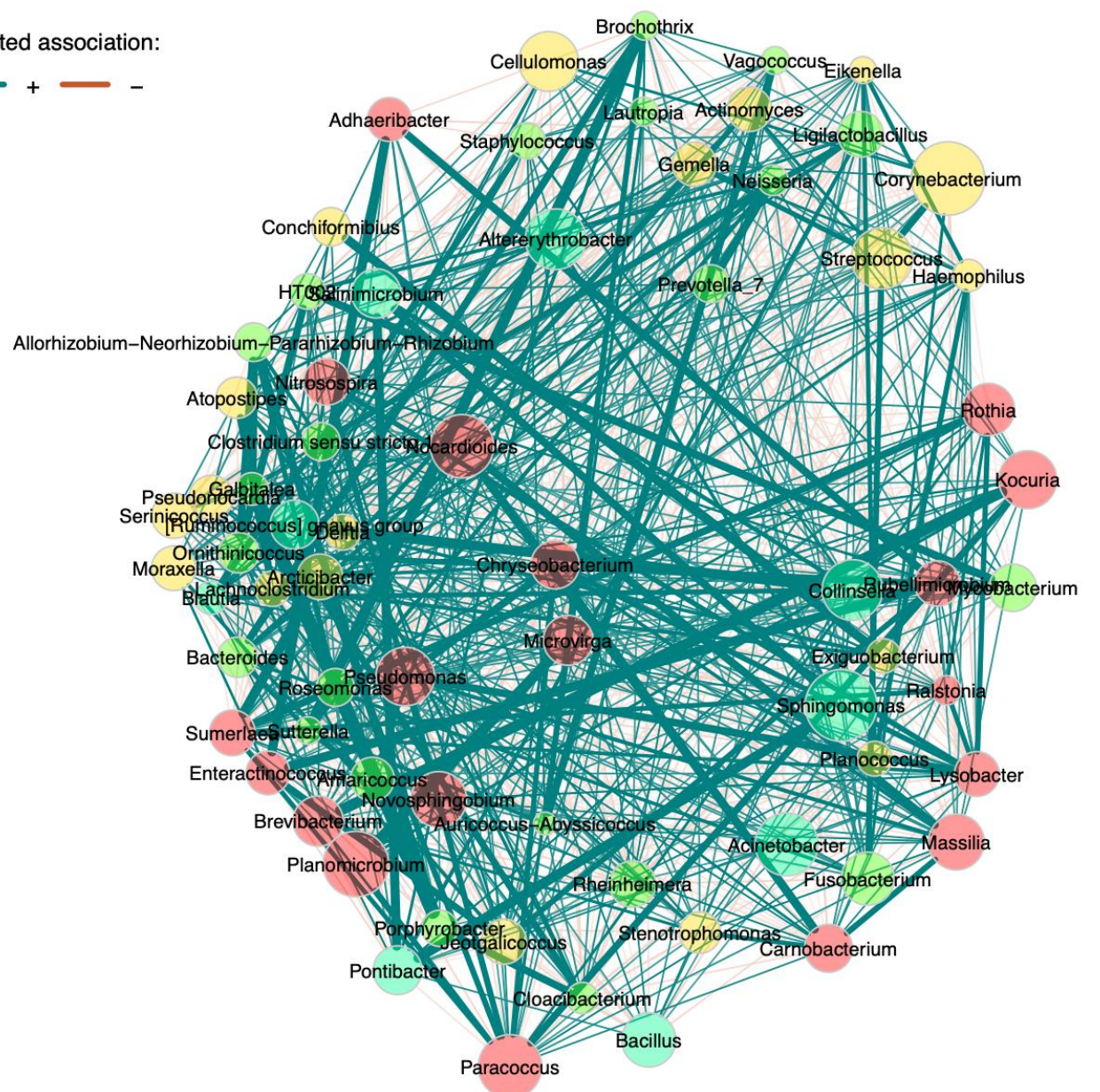
Cocina

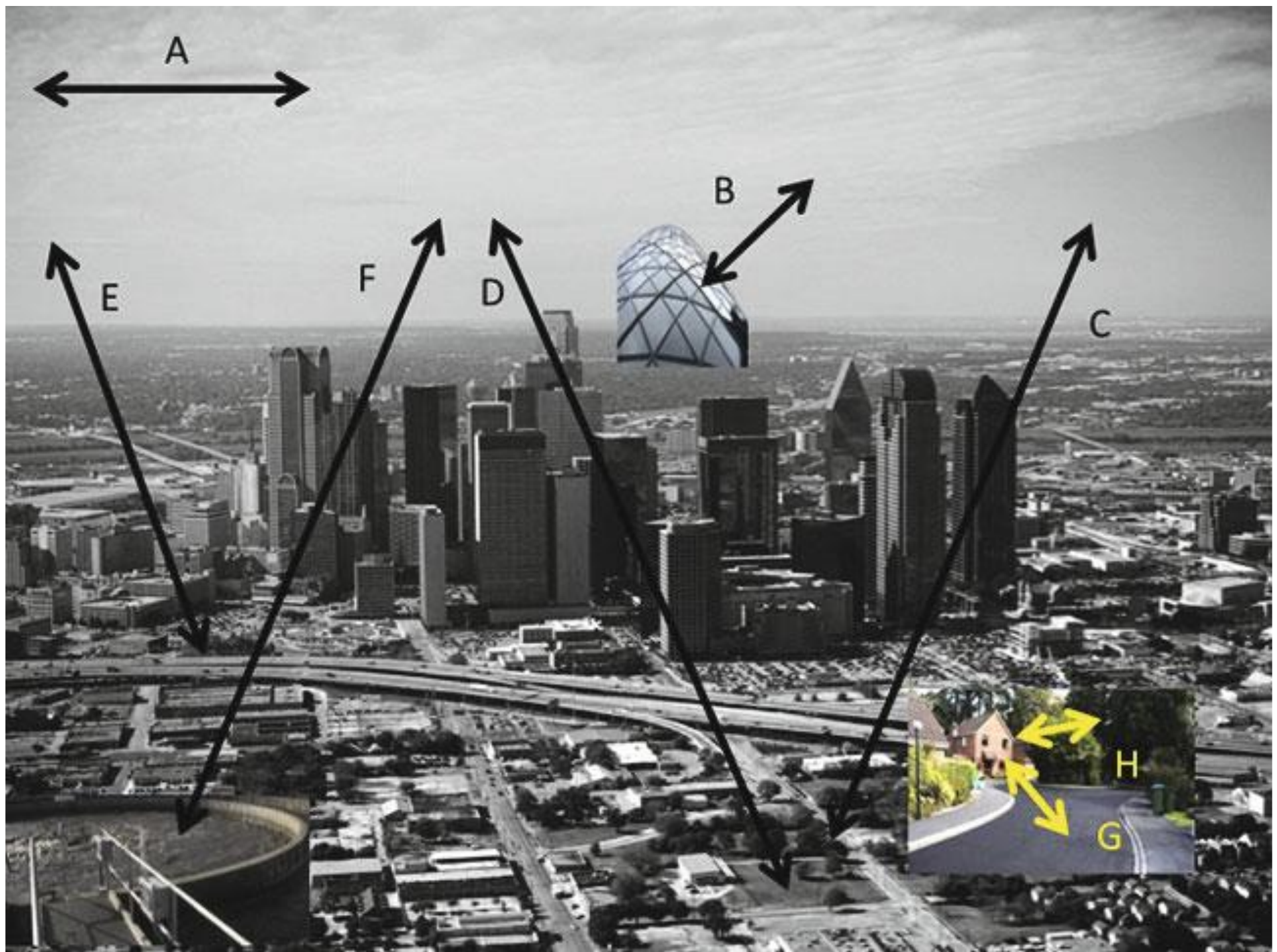


estimated association:

— + — -

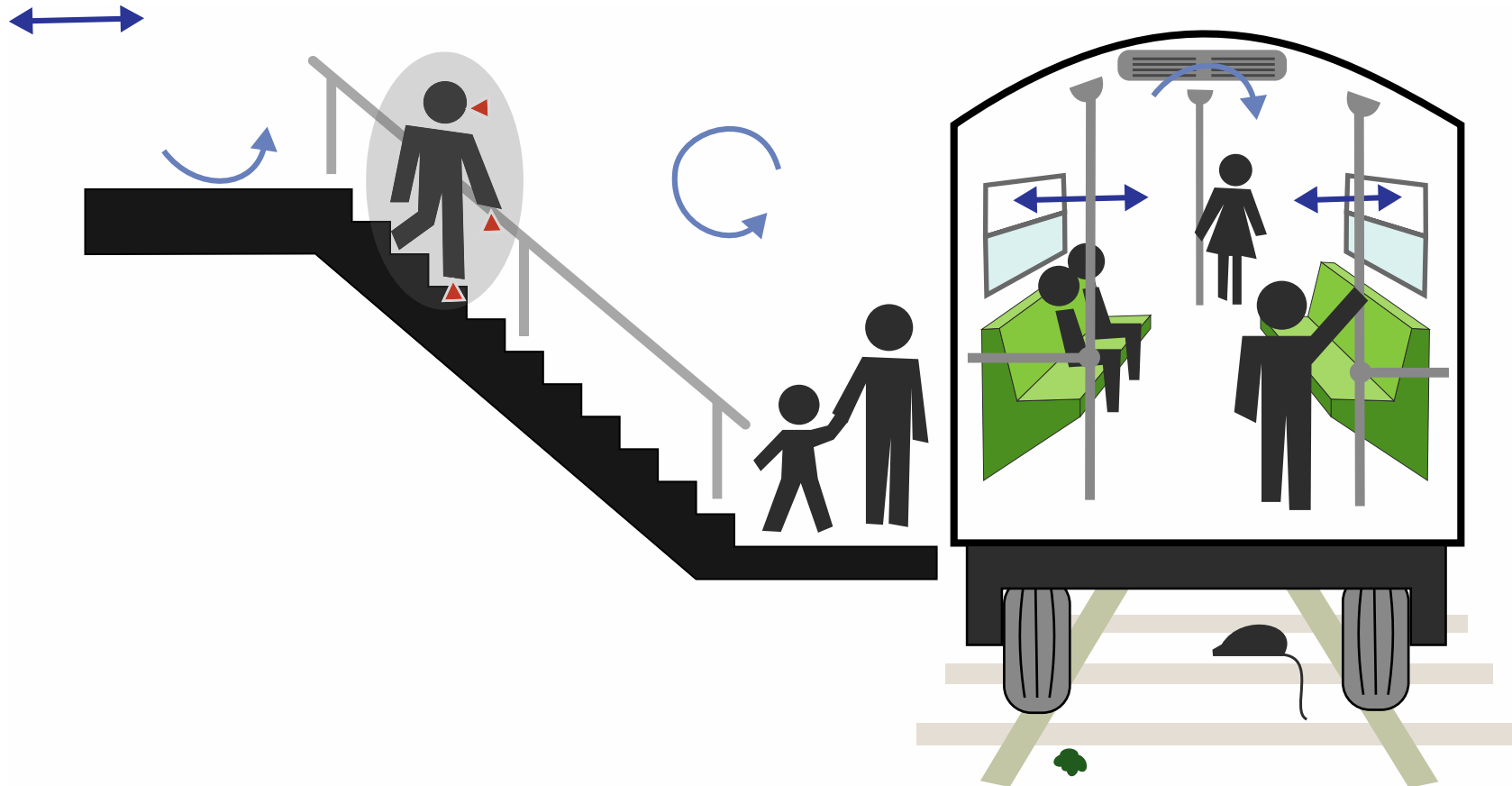
Comedor





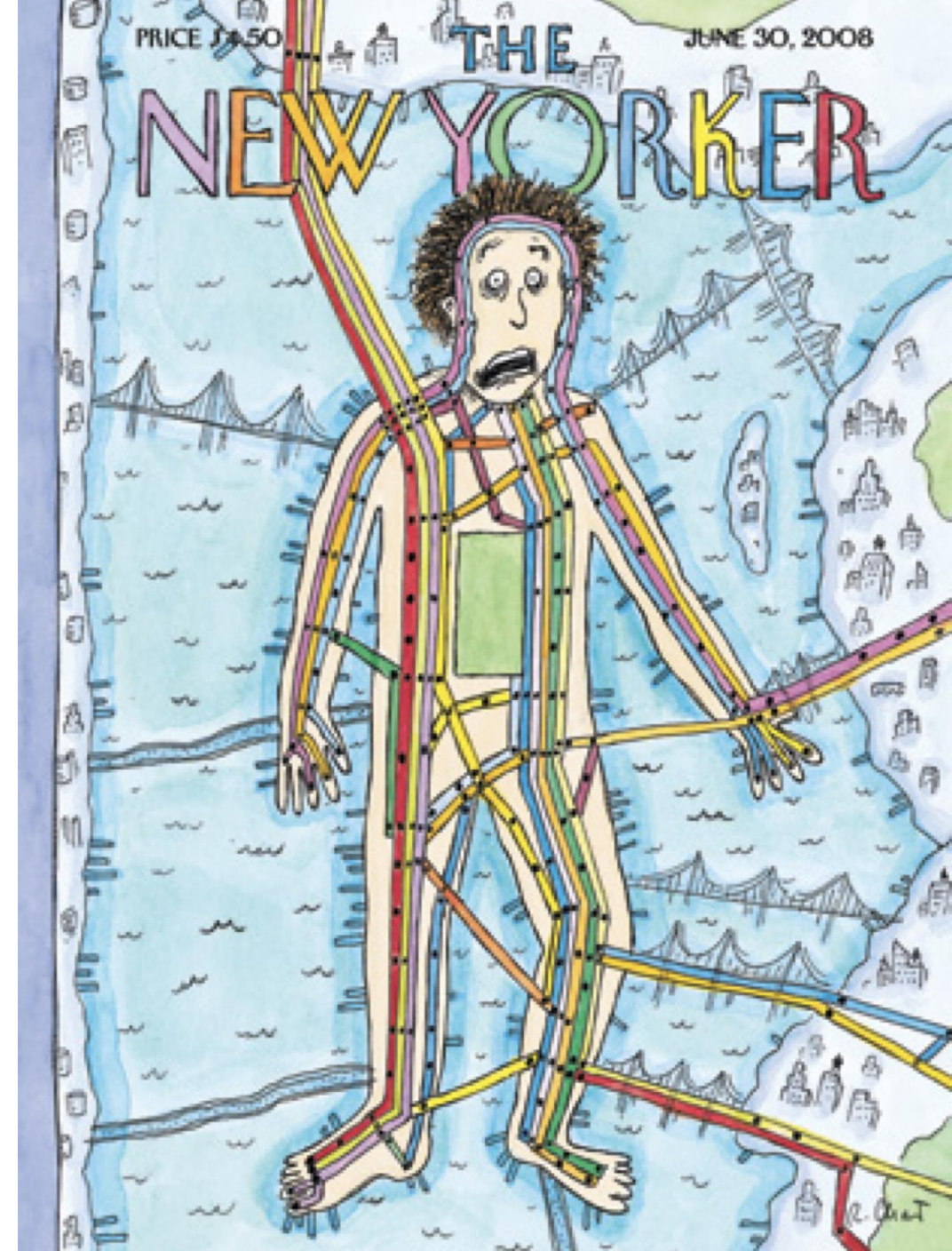
Where environmental microbiome meets its host: Subway and passenger microbiome relationships

Mariana Peimbert¹  | Luis D. Alcaraz²



Geospatial Resolution of Human and Bacterial Diversity with City-Scale Metagenomics

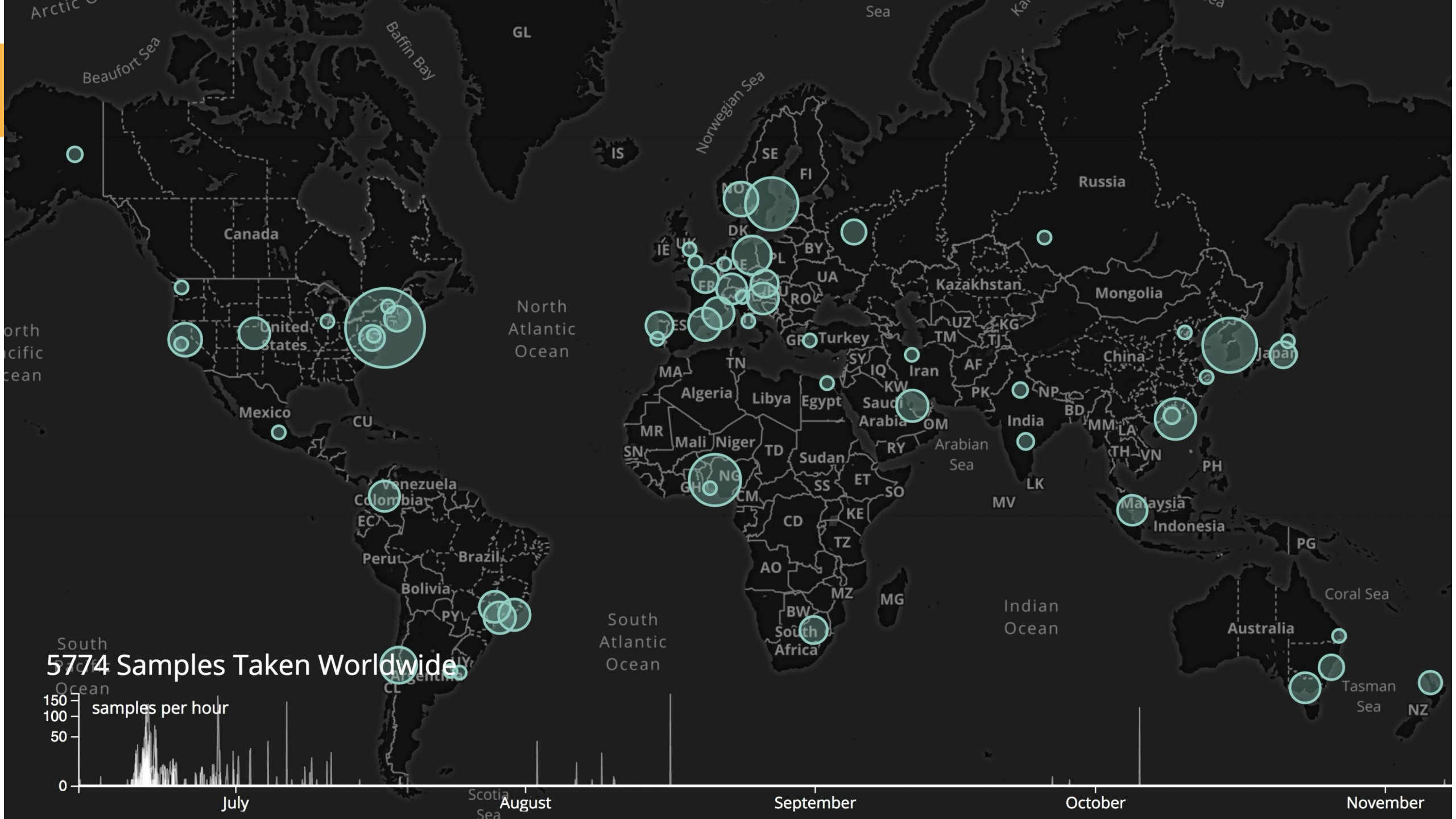
Ebrahim Afshinnekoo,^{1,2,3,21} Cem Meydan,^{1,2,21} Shanin Chowdhury,^{1,2,4} Dyala Jaroudi,^{1,2} Collin Boyer,^{1,2} Nick Bernstein,^{1,2} Julia M. Maritz,⁵ Darryl Reeves,^{1,2,6} Jorge Gandara,^{1,2} Sagar Chhangawala,^{1,2} Sofia Ahsanuddin,^{1,2,7} Amber Simmons,^{1,2} Timothy Nessel,⁸ Bharathi Sundaresh,⁸ Elizabeth Pereira,⁸ Ellen Jorgensen,⁹ Sergios-Orestis Kolokotronis,¹⁰ Nell Kirchner,^{1,2} Isaac Garcia,^{1,2} David Gandara,^{1,2} Sean Dhanraj,⁷ Tanzina Nawrin,⁷ Yogesh Saletore,^{1,2,6} Noah Alexander,^{1,2} Priyanka Vijay,^{1,2,6} Elizabeth M. Hénaff,^{1,2} Paul Zumbo,^{1,2} Michael Walsh,¹¹ Gregory D. O'Mullan,³ Scott Tighe,¹² Joel T. Dudley,¹³ Anya Dunaif,¹⁴ Sean Ennis,^{15,16} Eoghan O'Halloran,¹⁵ Tiago R. Magalhaes,^{15,16} Braden Boone,¹⁷ Angela L. Jones,¹⁷ Theodore R. Muth,⁷ Katie Schneider Paolantonio,⁵ Elizabeth Alter,¹⁸ Eric E. Schadt,¹³ Jeanne Garbarino,¹⁴ Robert J. Prill,¹⁹ Jane M. Carlton,⁵ Shawn Levy,¹⁷ and Christopher E. Mason^{1,2,20,*}



MetaSUB

Metagenomics & Metadesign of Subways & Urban Biomes





5774 Samples Taken Worldwide

samples per hour





Article

A global metagenomic map of urban microbiomes and antimicrobial resistance

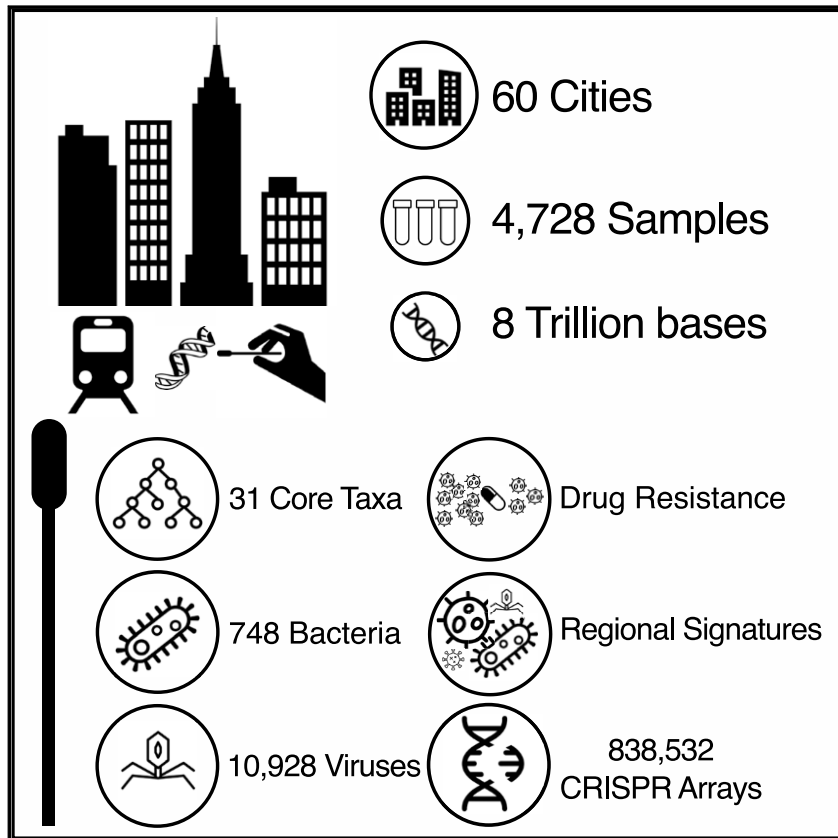


Table 1. Sample counts

Region	Pilot	CSD16	CSD17	Other	Total
North America	28	284	371	276	959
East Asia	34	26	1,297	0	1,357
Europe	177	310	939	1	1,427
Sub-Saharan Africa	0	116	192	0	308
South America	20	44	199	68	331
Middle East	0	100	15	0	115
Oceania	0	94	32	0	126
Background control	0	0	40	0	40
Lab control	0	0	20	6	26
Positive control	0	0	33	6	39
Total	259	974	3,138	357	4,728

The number of samples collected from each region.

Investigadores recorrieron 29 estaciones del tren subterráneo de Santiago recogiendo muestras de microorganismos de sus accesos.

FRANCISCO NÚÑEZ

Si viven en las profundidades de pozos petroleros. Si han hecho de su hogar géiseres y los kilómetros de hielo de la Antártica, y si llevan mucho más tiempo que el hombre en la Tierra, cómo miles de bacterias y microorganismos no iban a ser capaces de sobrevivir en el Metro.

Y, aunque era esperable que la confluencia de cientos de miles de usuarios al día en las distintas estaciones del mundo tuviese directa relación con el número de especies microbianas presentes en el transporte público, ningún estudio científico había levantado un catastro similar hasta ahora.

Juan Ugalde también ha organizado las recolecciones de muestras de

Estudio estableció los tipos de microorganismos que viajan con usted en el transporte público

La bacteria que causa el acné está en todas las estaciones del metro de Santiago y el mundo



Nacional



Bacteria que causa el acné está en el Metro: ¿Me puedo contagiar?

Ante la publicación de un estudio internacional al respecto, quisimos saber si este factor se relaciona directamente o no con la aparición de acné en la piel.

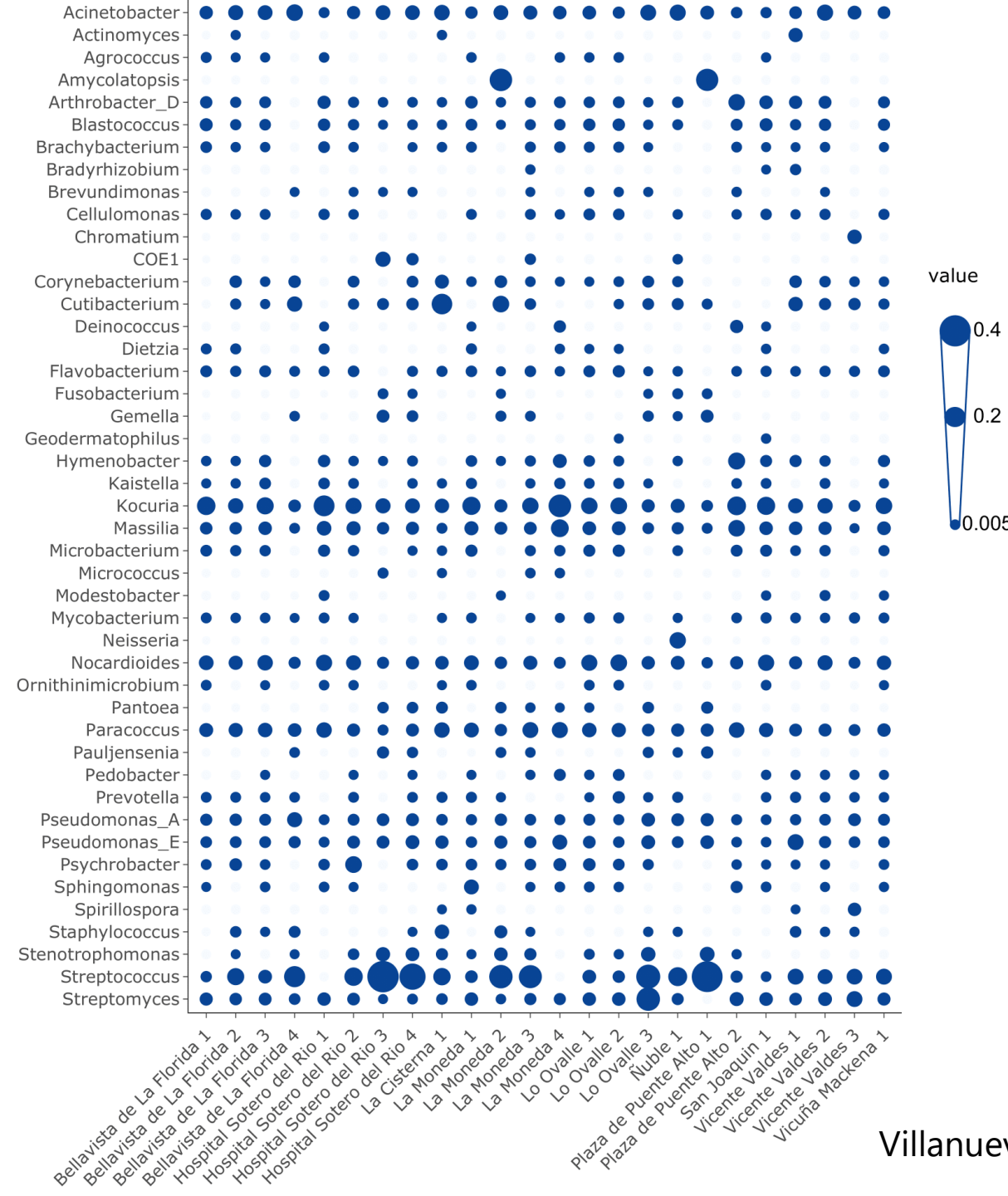
ROCK POP LO MÚSICA CONCIERTOS ACTUALIDAD CINE & CONCURSOS EN BÓVEDA
ULTIMO 24/7 SERIES VIVO R&P

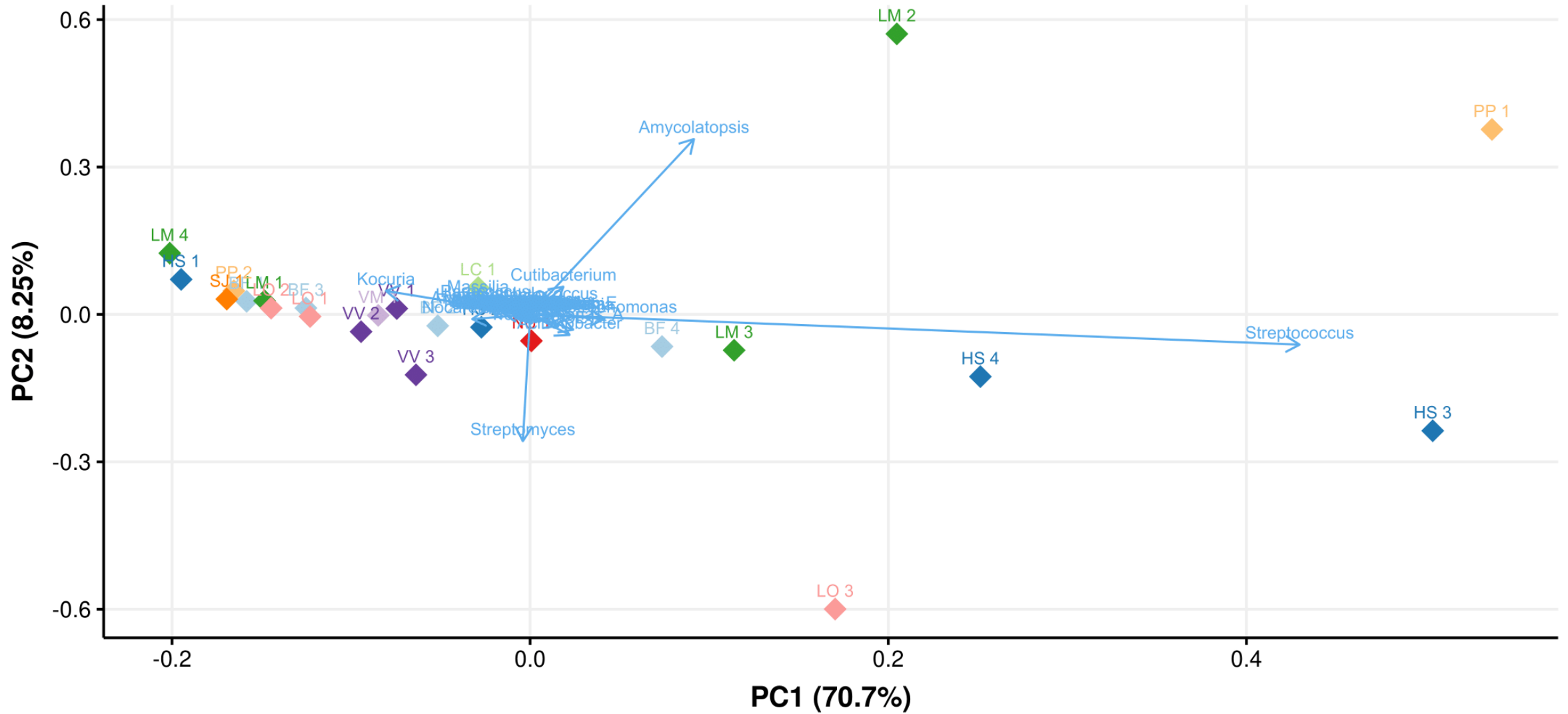
Bacteria del acné tiene presencia en toda la red del Metro de Santiago

A través un estudio la bacteria del acné llamada Cutibacterium acnes fue detectada en todas las estaciones del Metro de Santiago.

Por Catalina Maldonado | 12 Ago, 2019, 14:24 hrs







Station

BF - Bellavista de la florida	LC - La Cisterna	LO - Lo Ovalle	PP - Plaza de Puente Alto	VM - Vicuña Mackena
HS - Hospital Sotero del Río	LM - La Moneda	ÑU - Ñuble	SJ - San Joaquín	VV - Vicente Valdés



Agradecimientos



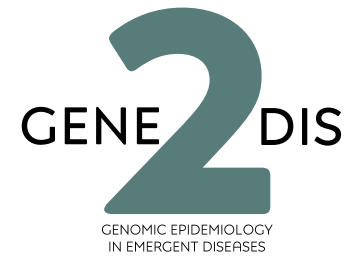
Universidad
Andrés Bello®



Fondecyt

Fondo Nacional de Desarrollo
Científico y Tecnológico

Gobierno de Chile



Juan A. Ugalde
juan@Ugalde.bio

