



Colloque 16 Septembre 2021 (Paris)

Approches Innovantes dans la lutte contre l'antibiorésistance

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TEAM / SAB / R&D Partners

Team



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Collaboration with:
Universidad Complutense Madrid (UCM)
Dr. Juan Borrero



Scientific Advisory Board

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IN MEMORIAM

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R&D Partners



The importance of microbes for life on our planet

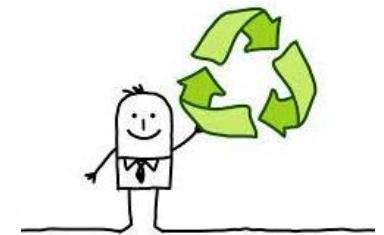
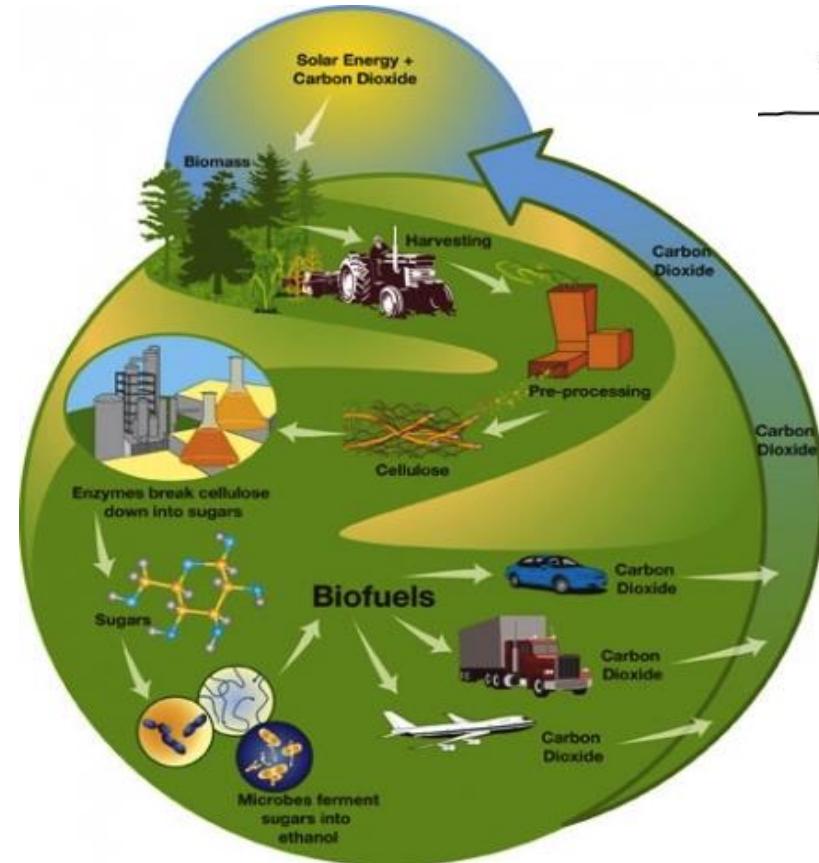
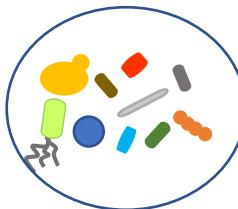


- Microbes are the chemical biocatalysers of our ecosystem
- Microbes are collaborating and fighting with each other to reach certain equilibrium to form communities: « microbiota »
- These microbiota have evolved to generate unique chemical reactions via species synergies

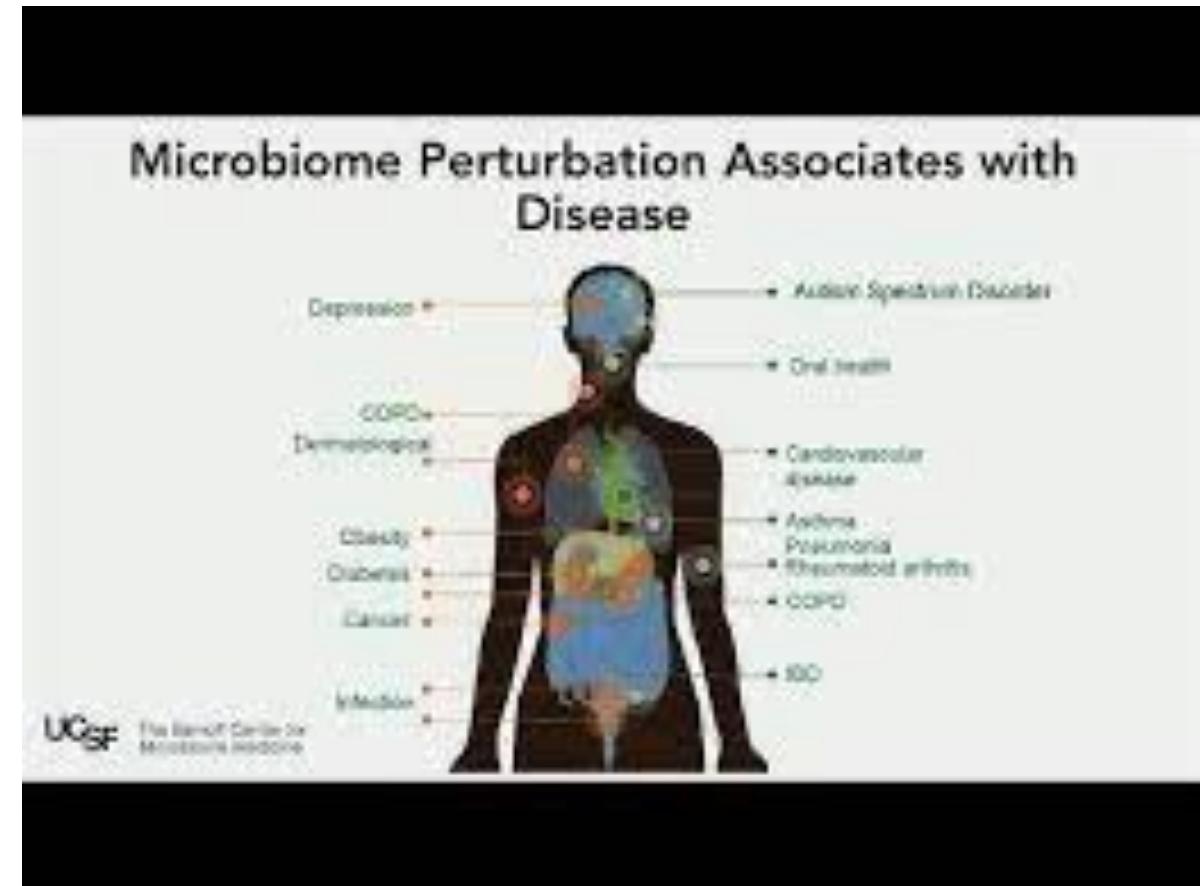
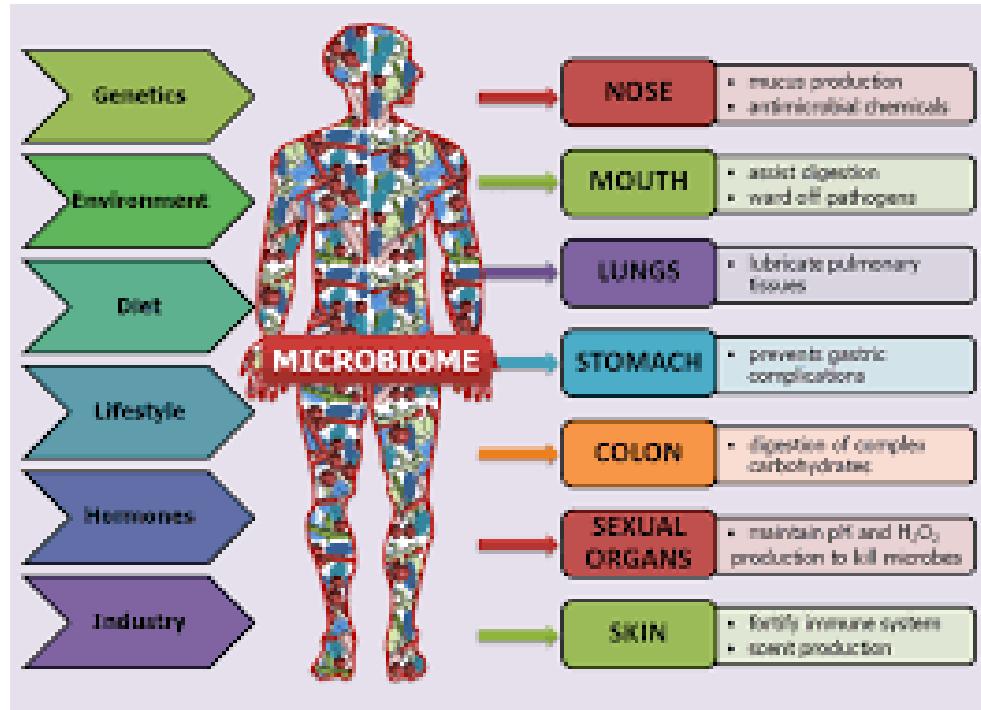


A Biobased Chemistry

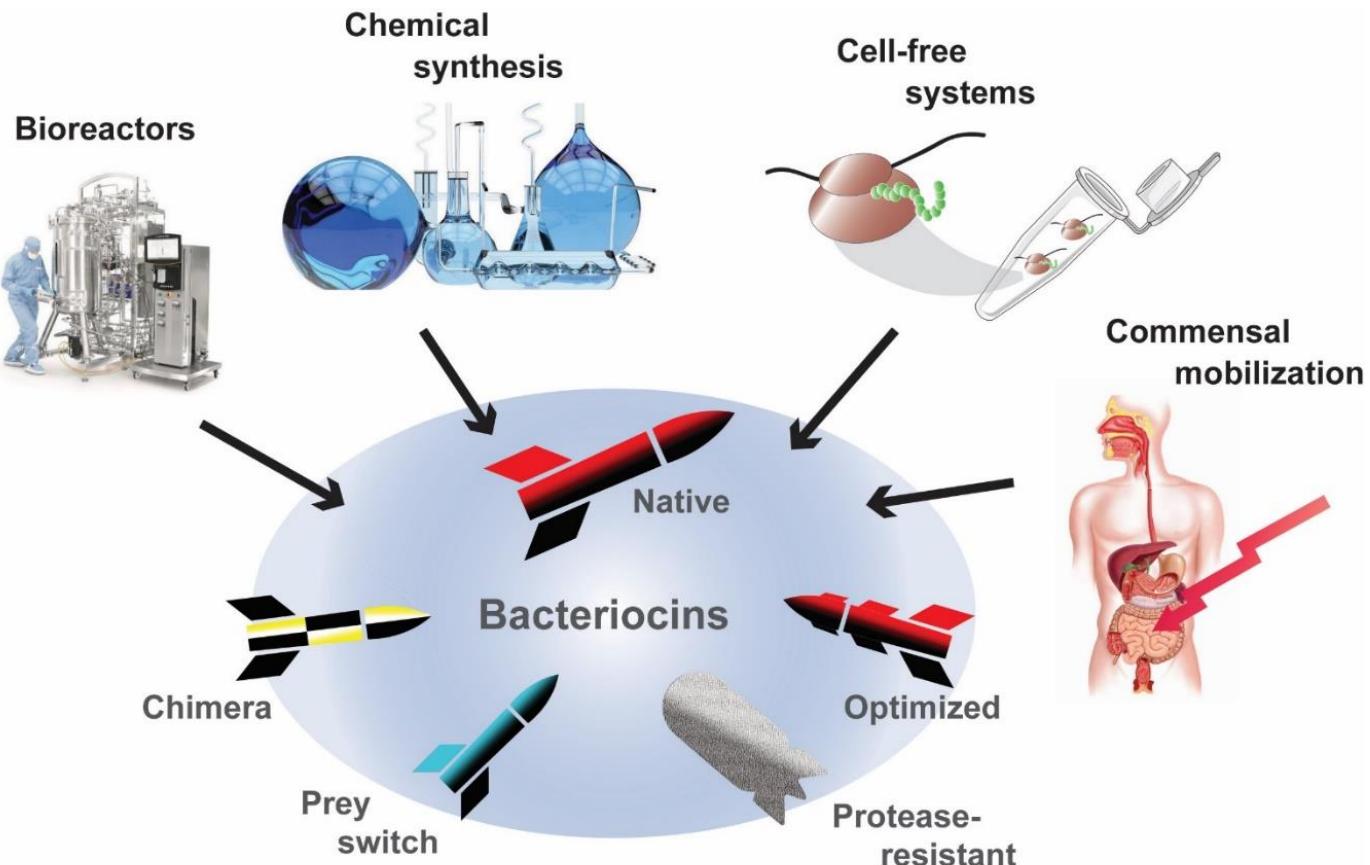
- Improvements in energy storage
- An intensification of biotechnological processes



Bacteria and our health



Bacteriocin potential



- Production
- Genetic amenability
- Various prey spectrum
- Molecular diversity
- Cyto-friendly
- Stability
- Biological half-life

Pascal Hols, Laura Ledesma-García, Philippe Gabant and Johann Mignolet,
 Trends Microbiology 1685 No. of Pages 13

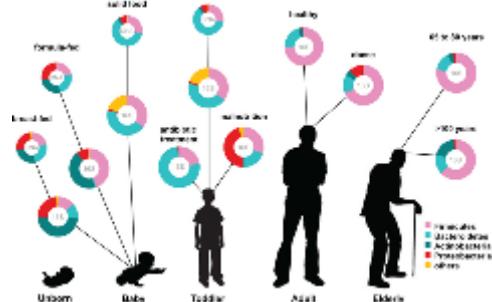
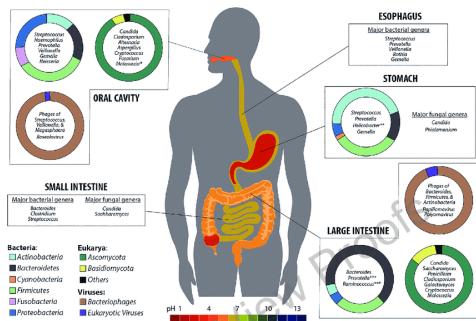
Bacteriocins as alternative to antibiotics



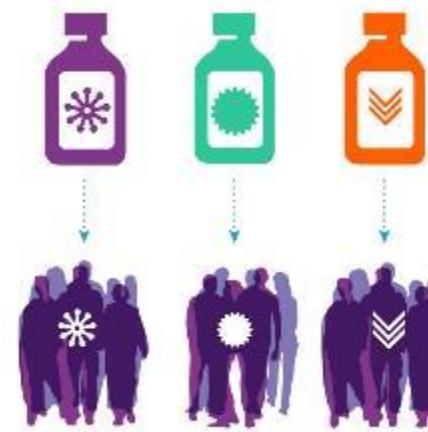
Broad spectrum antibiotics
VS
Narrow spectrum bacteriocins



Human microbiota is very variable



PRECISION MEDICINE



DATA



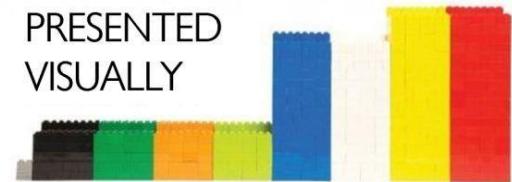
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ARRANGED



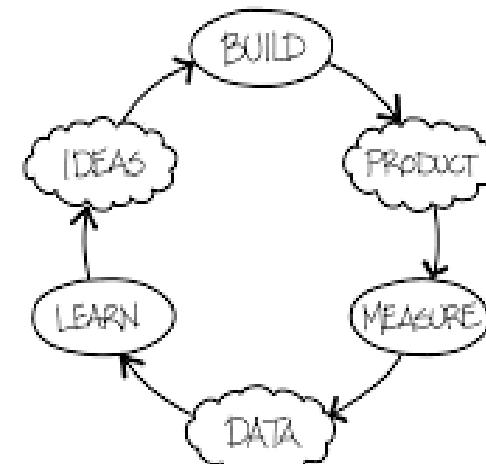
PRESENTED VISUALLY



EXPLAINED WITH A STORY

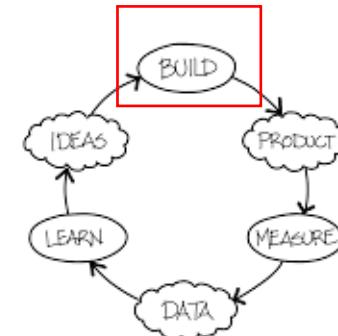


Evolution diversity of bacteriocins

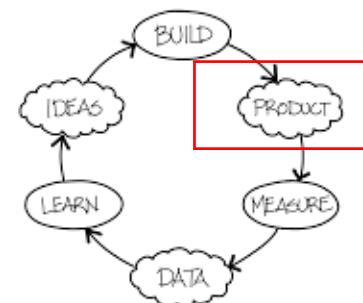
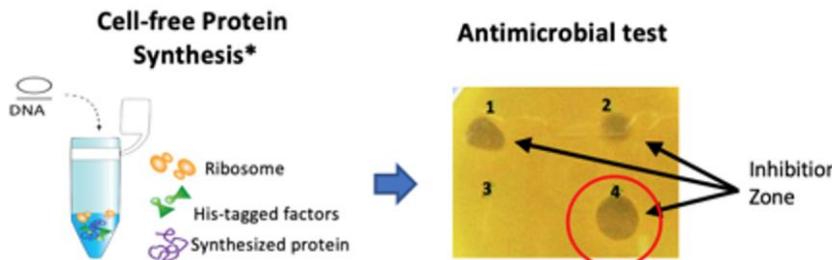


PARAGEN 1.0: A Standardized Synthetic Gene Library for Fast Cell-Free Bacteriocin Synthesis

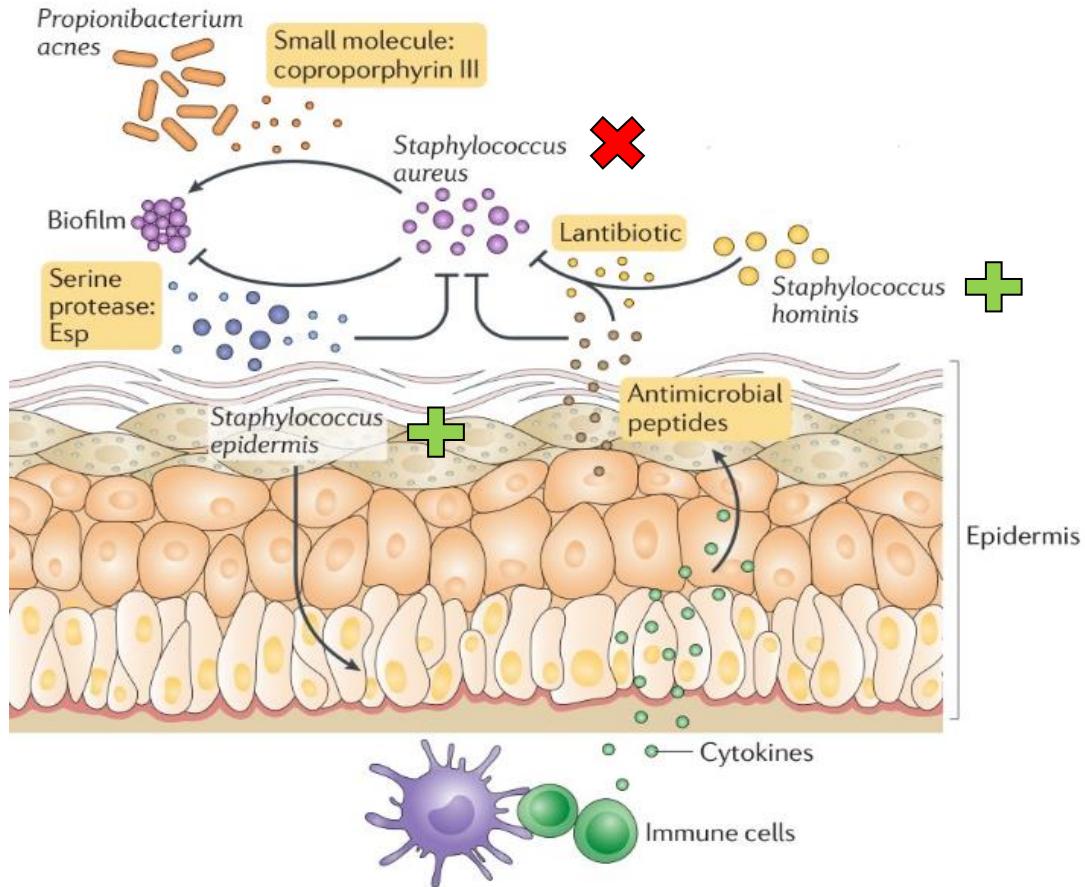
Philippe Gabant* and Juan Borrero†
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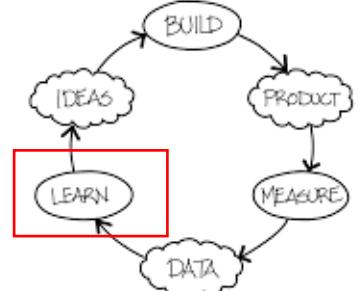
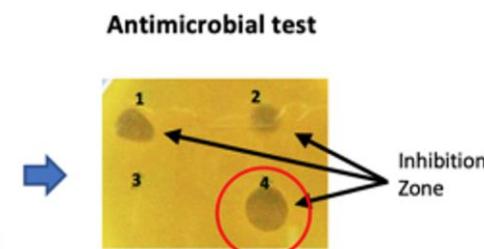
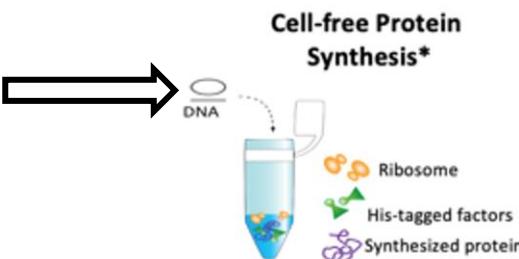
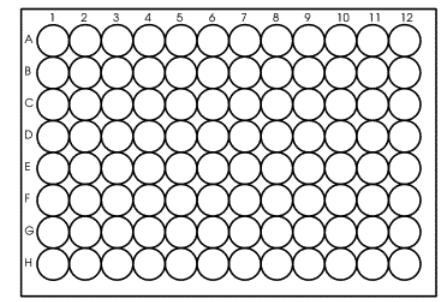
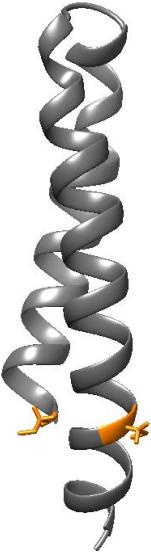
To explore the diversity of bacteriocins we have built a collection of synthetic genes in a standardized format allowing rapid activity measurements of bacteriocins products.



Example of a potential application



Mutant Library generation to determine structure/function relationships



Type of mutations

- Alanine scan
- Deletion
- Single or multiple amino acid mutation
- (Charge variation)
- (Disulfides bound)



Félix Jaumaux



Prof Cédric Govaerts and Prof Abel Garcia-Pino



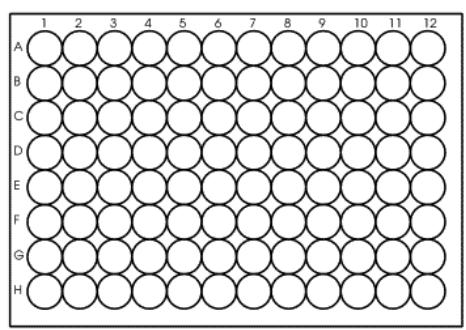
Professor
Pascal Hols



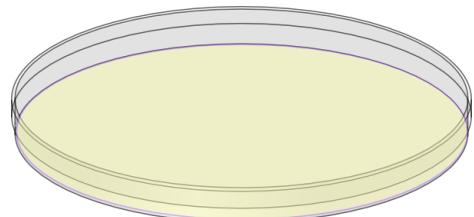
Screening of the PARAGEN collection



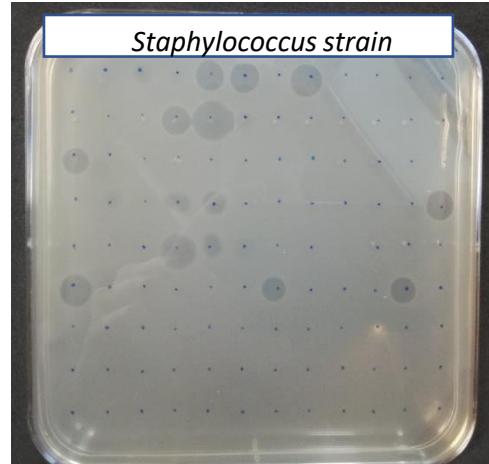
Félix Jaumaux



96 well plate containing chemically synthesized bacteriocins



Petri dish with a homogenous culture of a *Staphylococcus* strain



Observation of inhibition halos

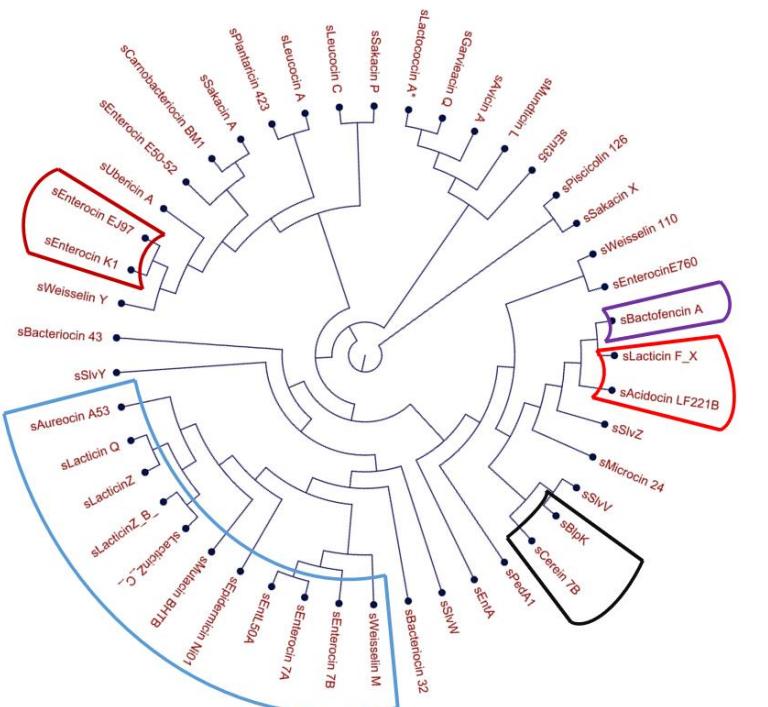


Professor
Pascal Hols



Professor
Jacques Mahillon

Screening looking for bacteriocins active against *S. aureus* (7 strains tested)



Bacteriocins non active against *S. epidermidis* (2 strains tested)

A; B; C

Publications

BRIEF RESEARCH REPORT ARTICLE

Front. Bioeng. Biotechnol., 06 September 2019 | <https://doi.org/10.3389/fbioe.2019.00213>

PARAGEN 1.0: A Standardized Synthetic Gene Library for Fast Cell-Free Bacteriocin Synthesis

Philippe Gabant* and Juan Borrero†

Syngulon, Seraing, Belgium

[Home](#) / [Chimica Oggi-Chemistry Today](#) / [Vol. 38\(4\)](#) / Antimicrobial peptides to...

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ANTIMICROBIAL PEPTIDES TO SHAPE BIOBASED CHEMICAL PRODUCTION

Keywords: anti-microbial peptides, antibiotics, bacteriocins, biotechnology, industrial fermentation, microbiome, one health

Other manuscripts in preparation

Subtle selectivity in a pheromone sensor triumvirate desynchronizes competence and predation in a human gut commensal

Johann Mignolet^{1,2*}, Guillaume Cerckel^{1†}, Julien Damoczi^{1†}, Laura Ledesma-Garcia¹, Andrea Sassi³, Tom Coenye³, Sylvie Nessler⁴, Pascal Hols¹

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Trends in Microbiology

Review

Mobilization of Microbiota Commensals and Their Bacteriocins for Therapeutics

Pascal Hols,¹ Laura Ledesma-Garcia,¹ Philippe Gabant,² and Johann Mignolet ^{1,2,3,*}

Open Access Perspective

In the Age of Synthetic Biology, Will Antimicrobial Peptides be the Next Generation of Antibiotics?

by Félix Jaumaux , Luz P. Gómez de Cadiñanos  and Philippe Gabant * 

Syngulon, Rue du Bois Saint-Jean 15/1, 4102 Seraing, Belgium

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Take home message

1. Industries and the health sectors are looking for new ways to control microbial flora (microbiota)
2. Synthetic biology allows to apply biological functions at a new level
3. Bacteriocins are natural antimicrobial peptides (AMP) used by bacteria to protect their ecological niche
4. Syngulon has built PARAGEN a unique collection of synthetic bacteriocin genes (around 500 genes)
5. Via academic collaborations Syngulon is studying the mode of action of bacteriocins
6. Via different industrial/medical partnerships Syngulon is testing applications of bacteriocins

