



# Apport de la microscopie en microbiologie pour l'étude des interactions

Eric Guédon

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Eric Guédon. Apport de la microscopie en microbiologie pour l'étude des interactions. 11èmes Journées Scientifiques et Techniques du Réseau des Microscopistes de l'INRAE, INRAE, Nov 2022, Rennes, France. hal-03874492

**HAL Id: hal-03874492**

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Submitted on 28 Nov 2022

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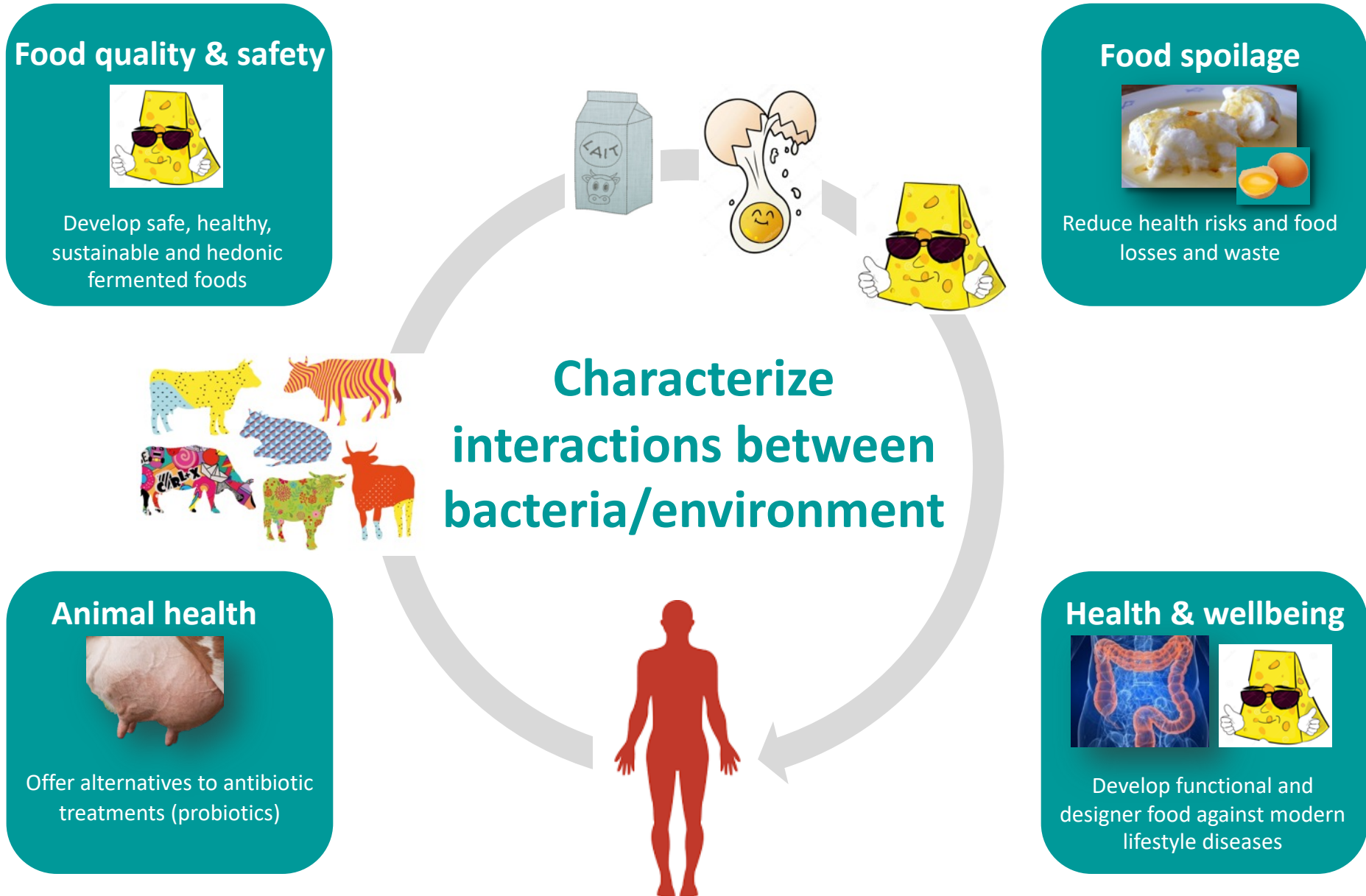
# ➤ Apport de la microscopie en microbiologie pour l'étude des interactions

Éric GUÉDON

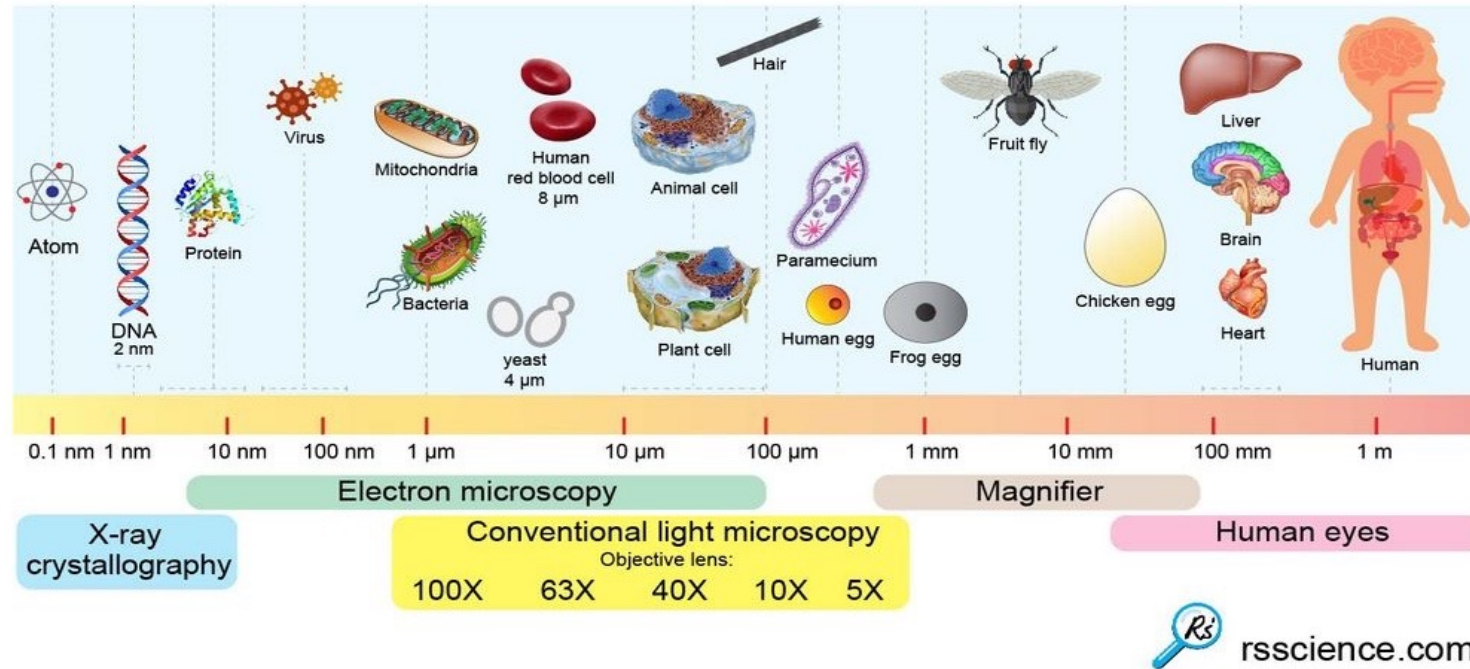
UMR1253, STLO, INRAE, Institut Agro, Rennes

11èmes Journées Scientifiques et Techniques du Réseau des Microscopistes de l'INRAE

## ➤ The STLO research lines ...



# ➤ Microscopy use in microbiology: why and what for...



❖ Bacterial adaptation studies

❖ Functional genomic studies

❖ Spatialisation studies (interactions)

INRAE



Bacterial adaptation studies

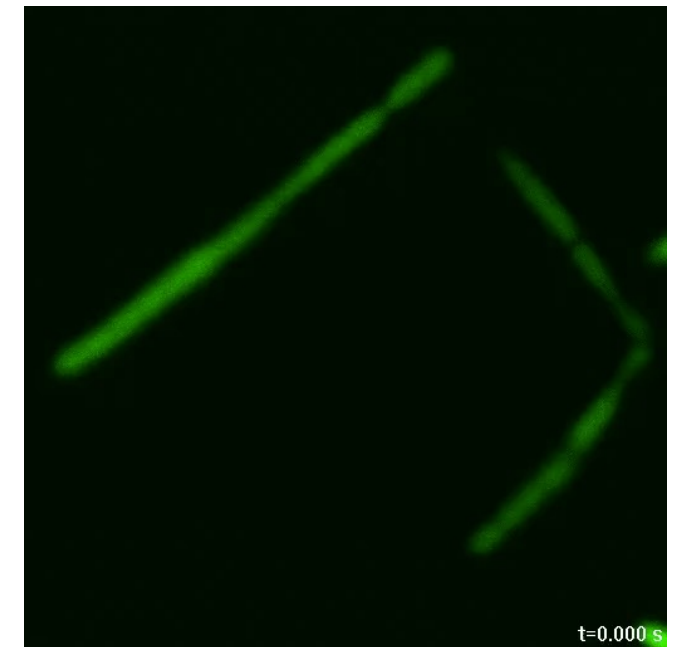
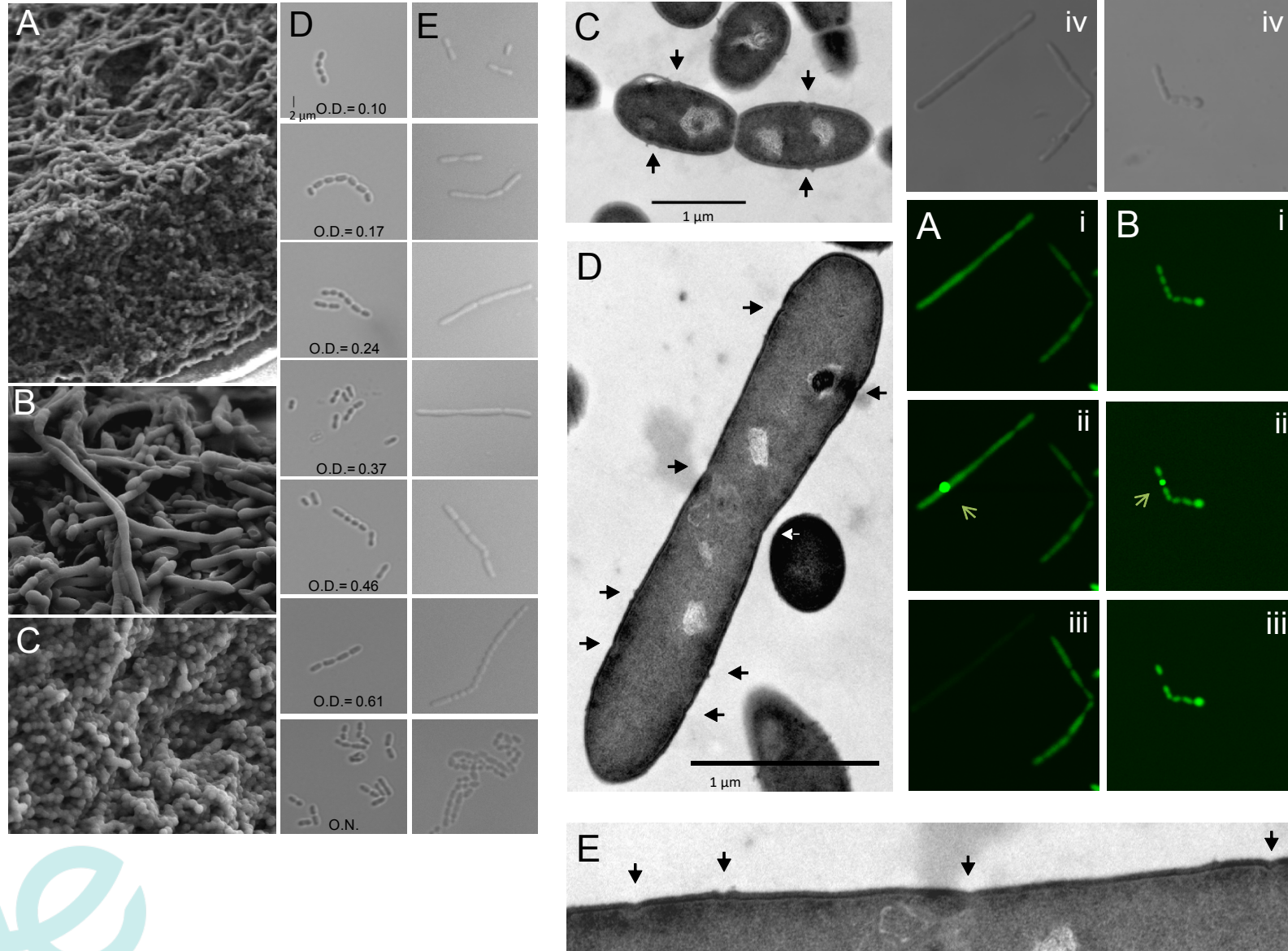
# ➤ Adaptation and morphogenesis

*Lactococcus Lactis* biofilm

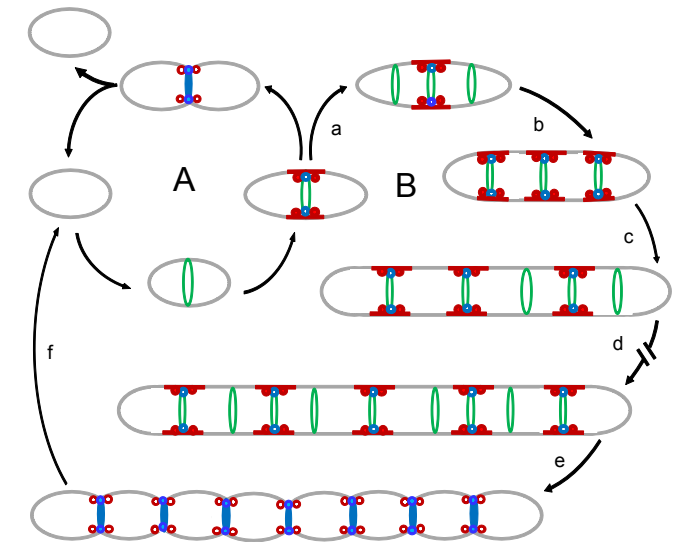
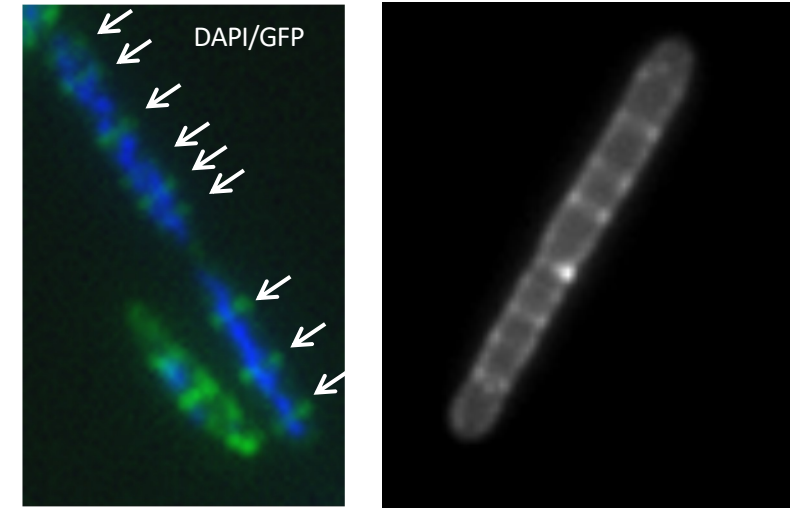
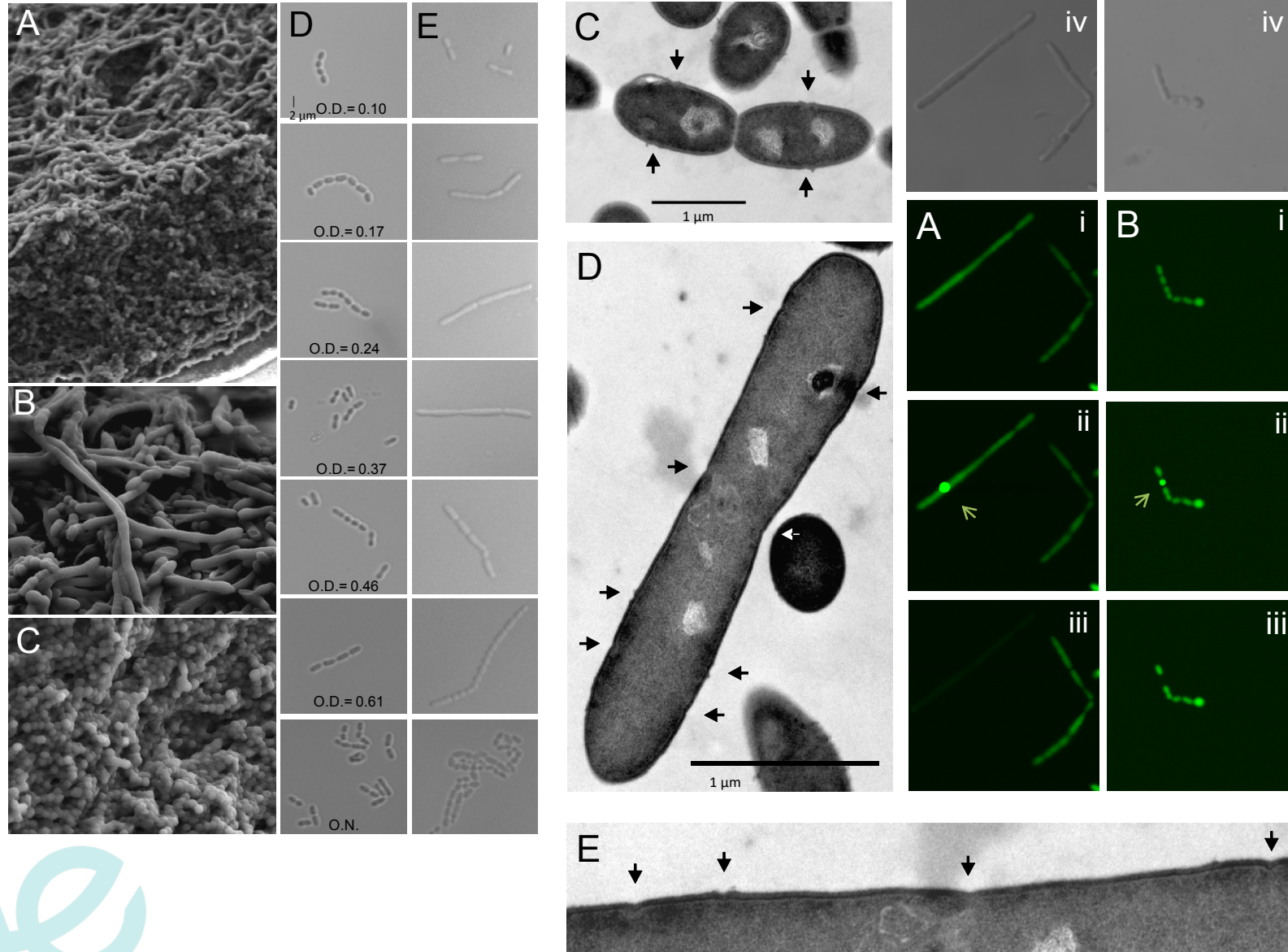


MIMA2, R. Briandet, T. Meylheuc

# ➤ Adaptation & morphogenesis



# ➤ Adaptation & morphogenesis



INRAE



Functional genomic studies



# ➤ Synthesis of surface components

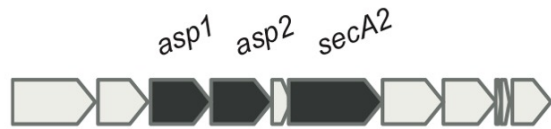
*Streptococcus salivarius*

JIM8777



➤ EPS

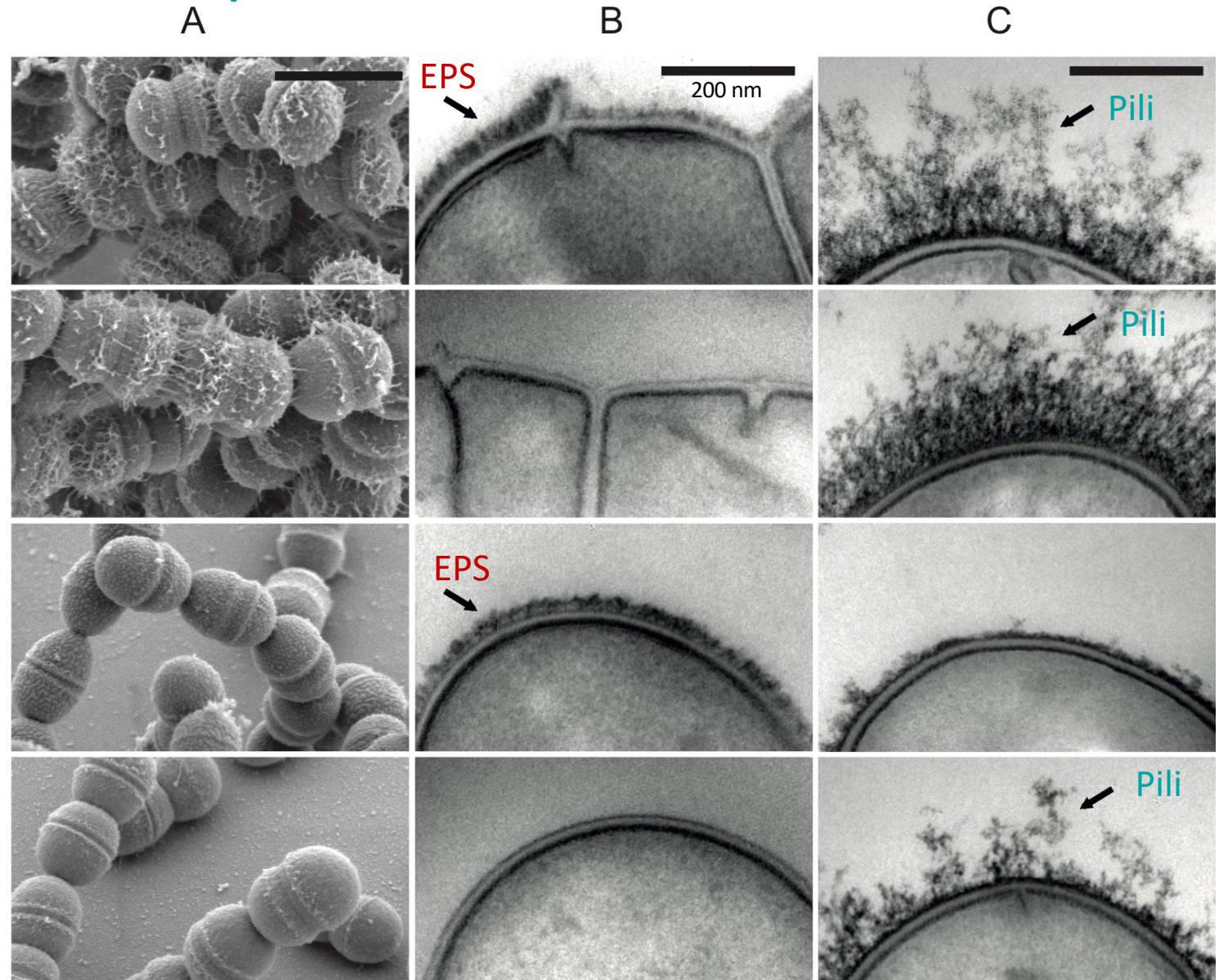
$\Delta cwpK$



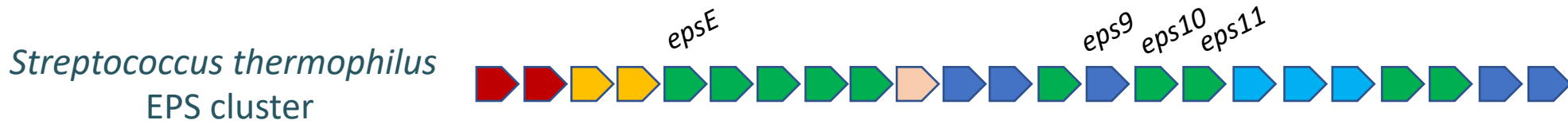
➤ Pili

$\Delta asp1$

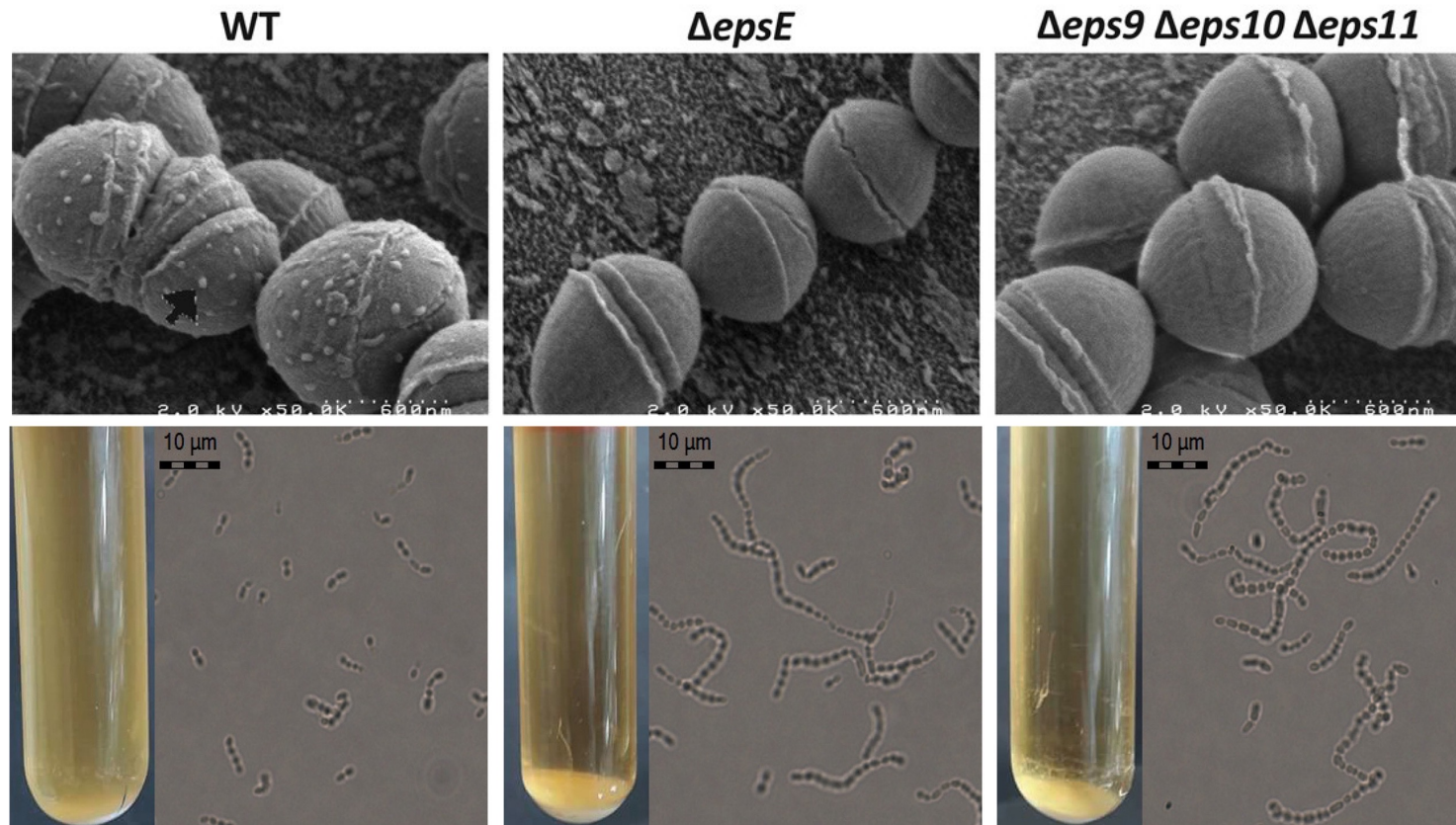
$\Delta cwpK$   
 $\Delta asp1$



# ➤ Unexpected phenotypes



Relationship  
between EPS  
synthesis and



chain-length and  
sedimentation ...

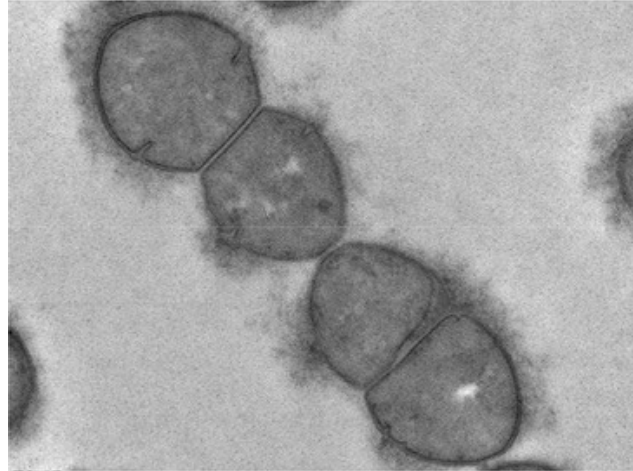


# ➤ Impact on cell morphology

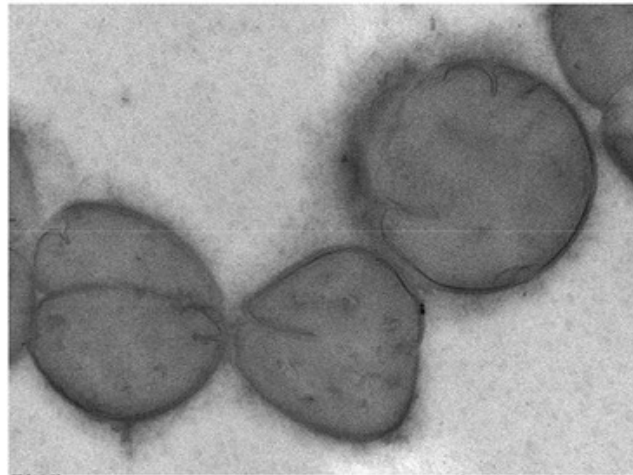
Septation and division

Cell wall thickness

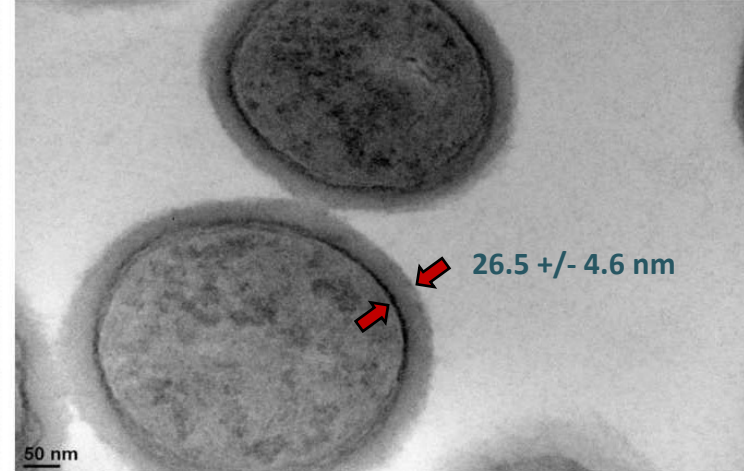
*Streptococcus thermophilus*  
LMG18311



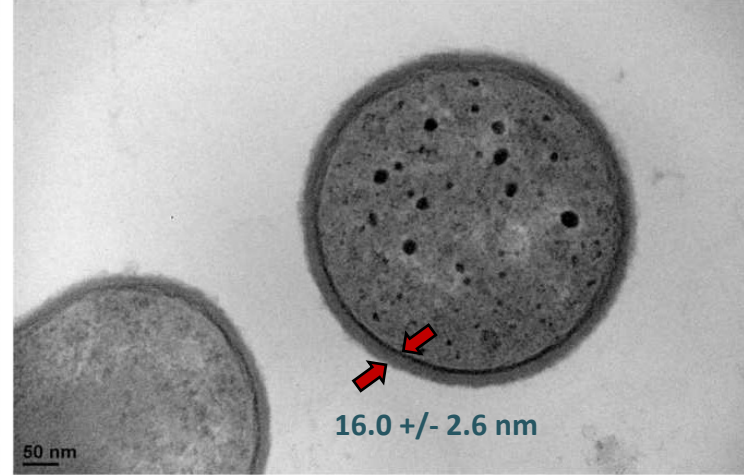
*Streptococcus thermophilus*  
LMG18311 tagO



Dahmane et al., AEM, 2018



*Lactobacillus casei*  
BL23



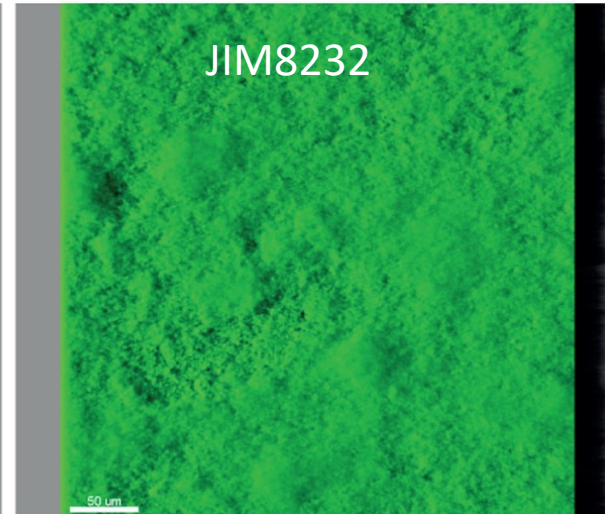
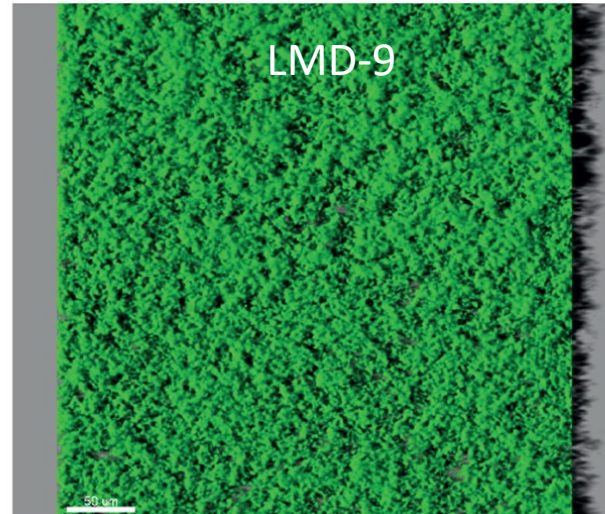
*Lactobacillus casei*  
BL23 srtA2

Souza et al., PLoS One, 2017

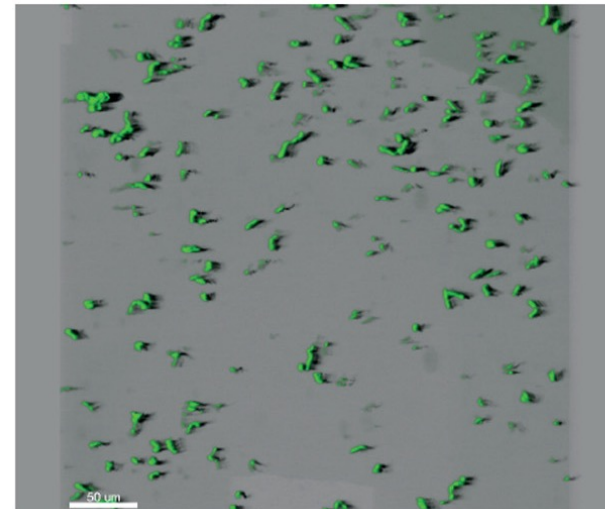
## ➤ Biofilm forming ability

*Streptococcus thermophilus*

Before washing

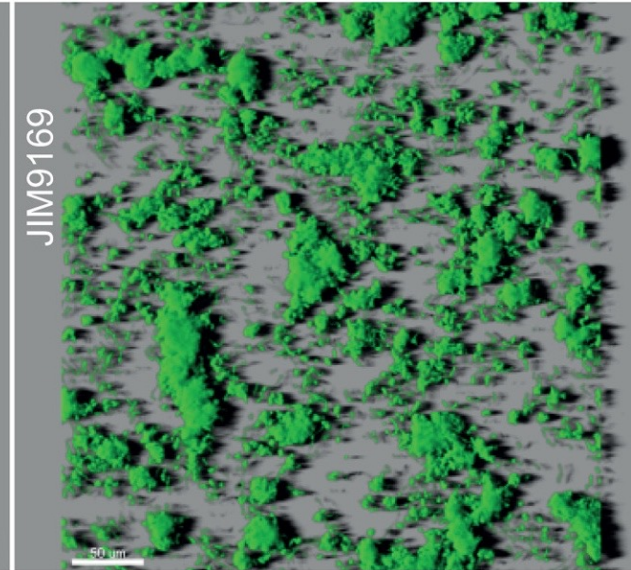
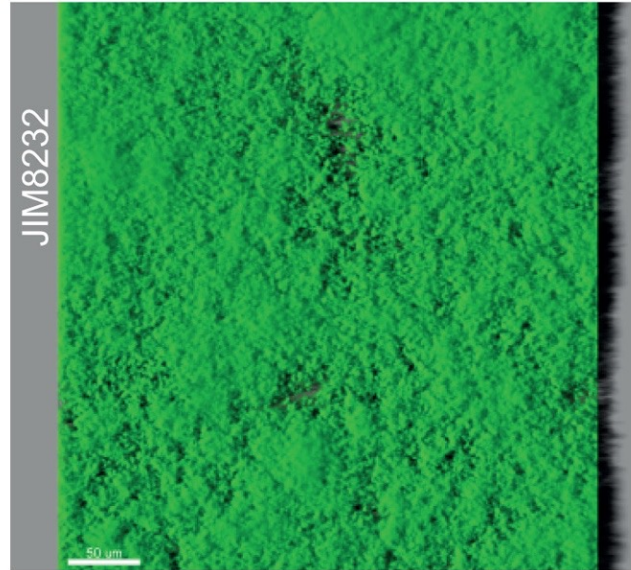


After washing



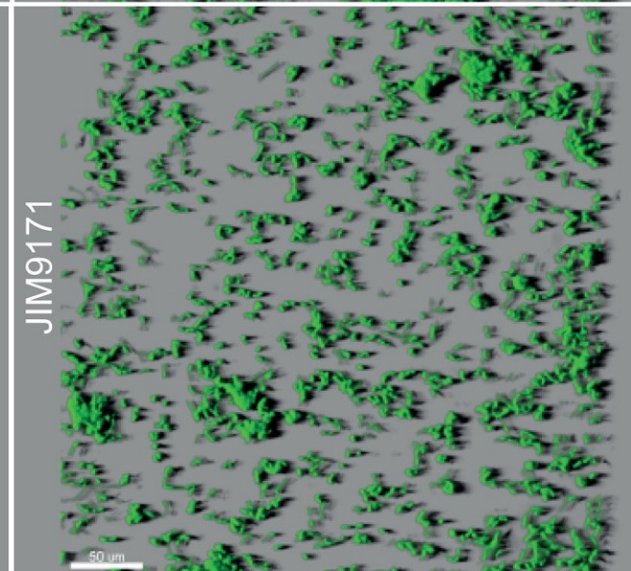
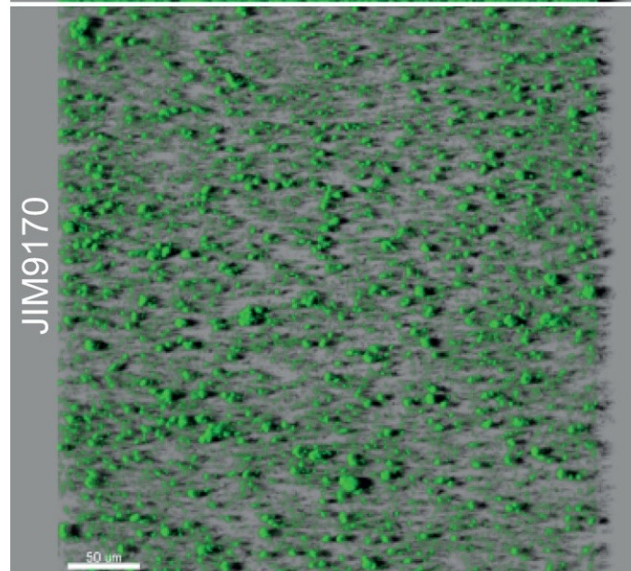
## ➤ Biofilm forming ability

*Streptococcus thermophilus*  
WT



Mutant for initial adhesion

Mutant for biofilm cohesion



Mutant for initial adhesion  
and biofilm cohesion



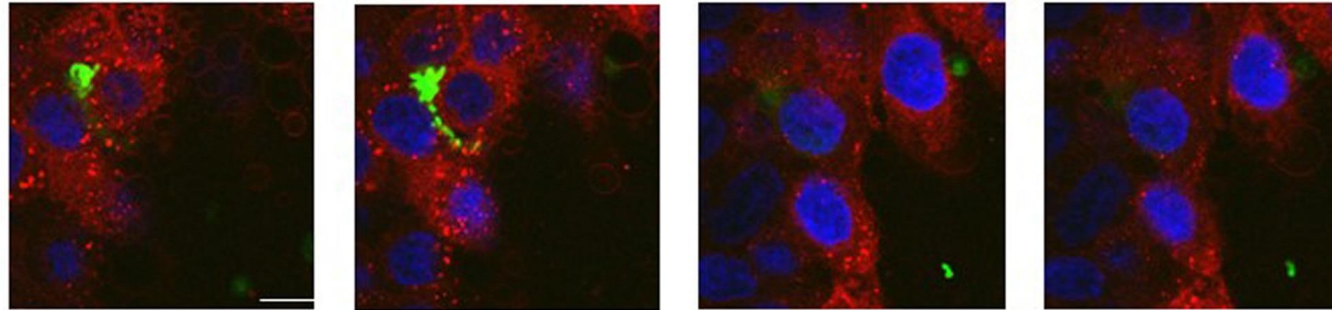
INRAE



Spatialisation/localization  
studies

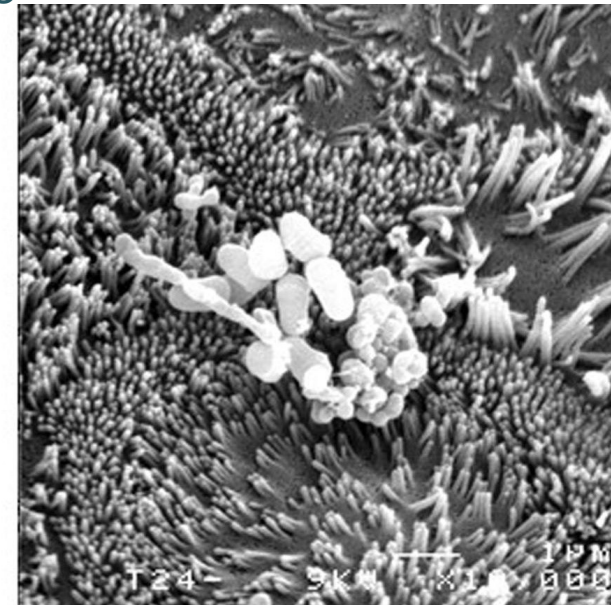
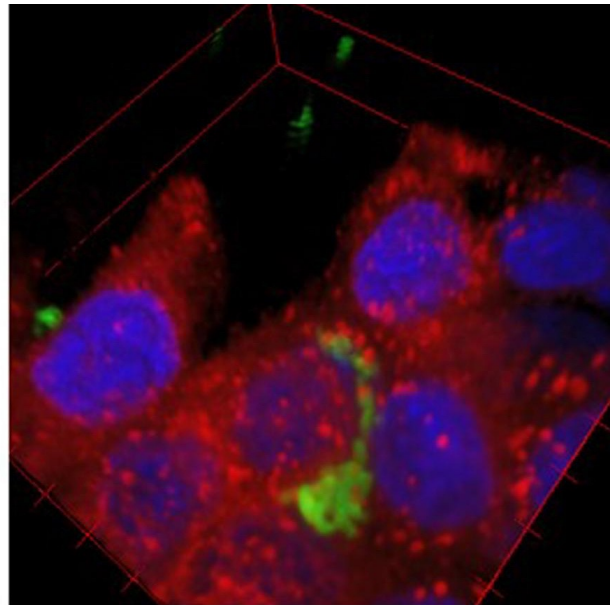
## ➤ Adhesion of probiotic to host cells

*Propionibacterium freudenreichii*



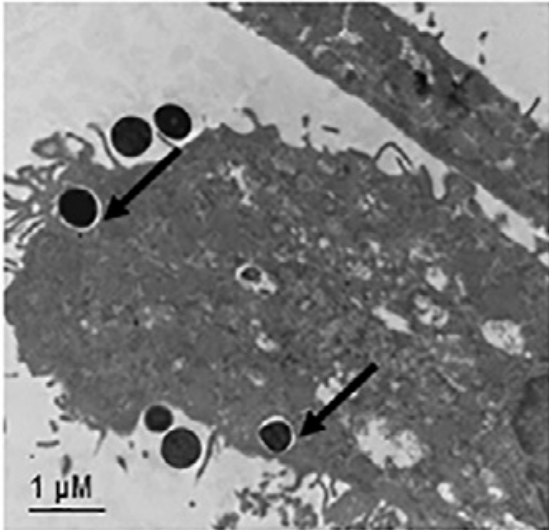
Scale bar = 10µm

HT-29

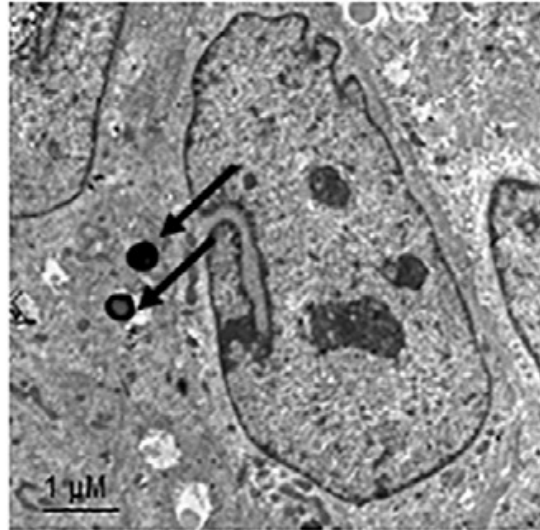


## ➤ Internalization and persistence of *S. aureus*

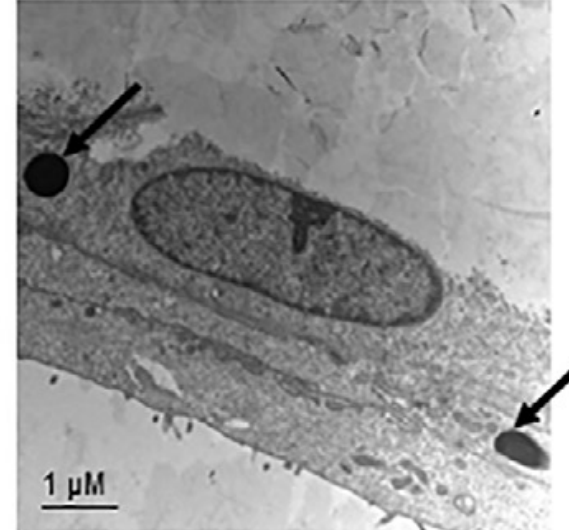
45 min



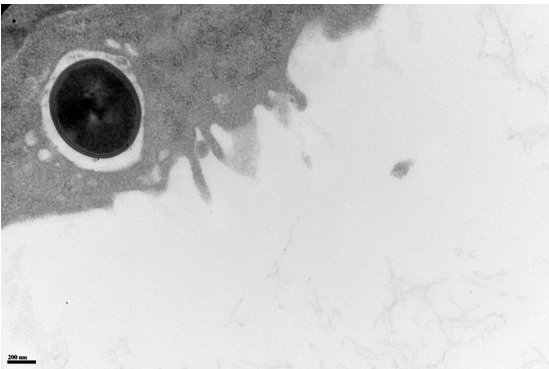
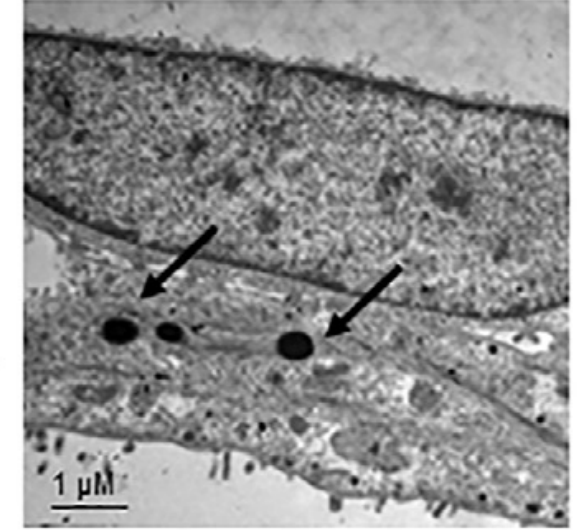
6 hours



3 days



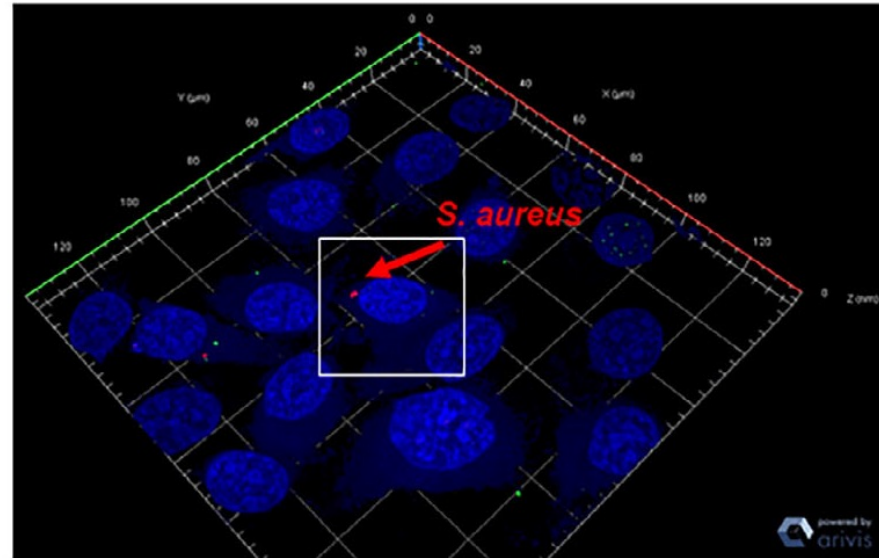
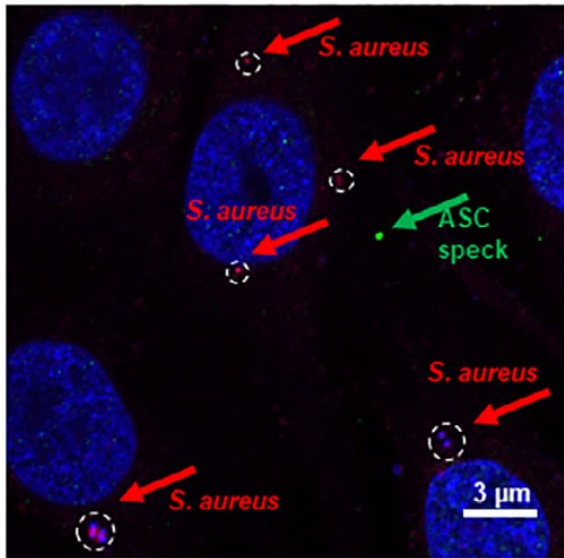
12 days



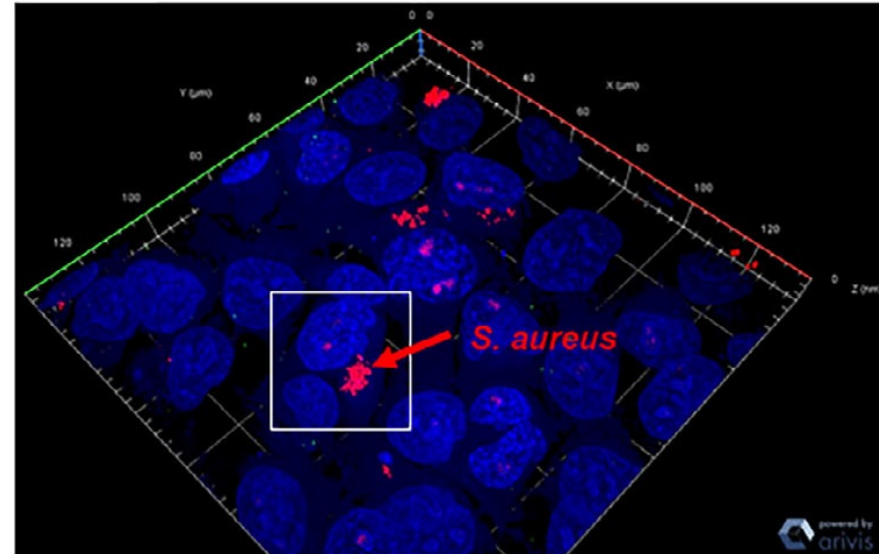
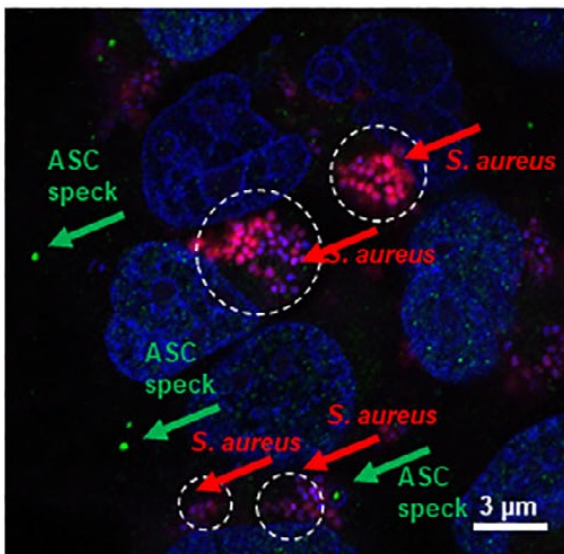
## ➤ Host defenses against *S. aureus*

MG-63

WT



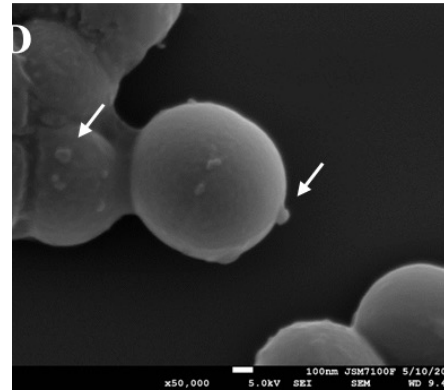
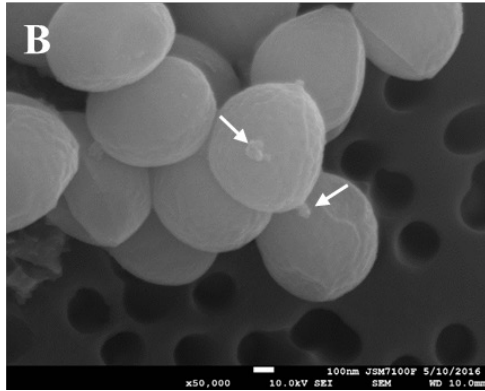
CASP1<sup>-/-</sup>



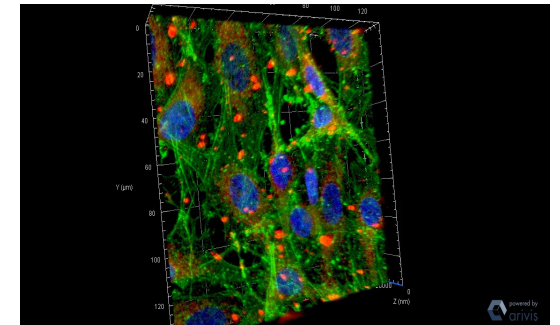
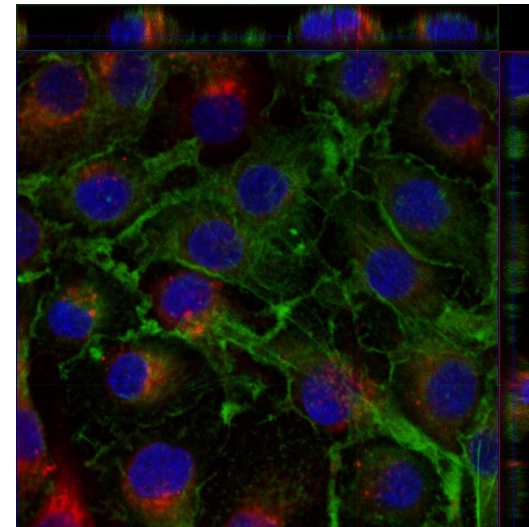
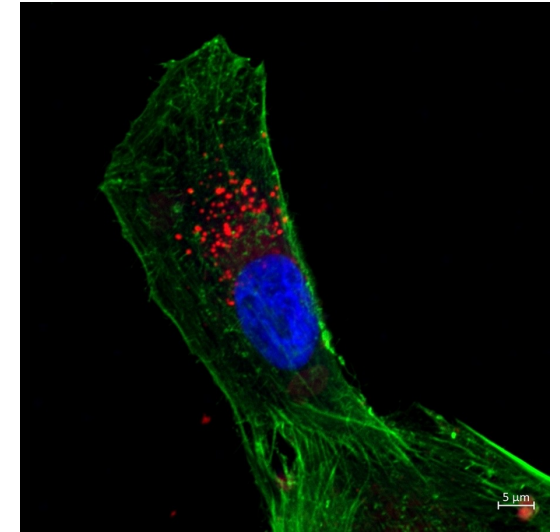
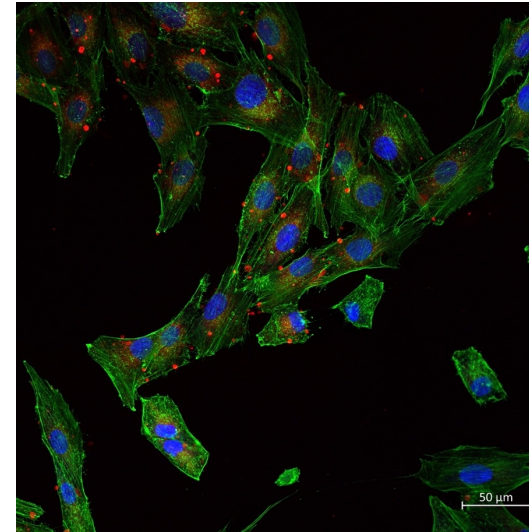
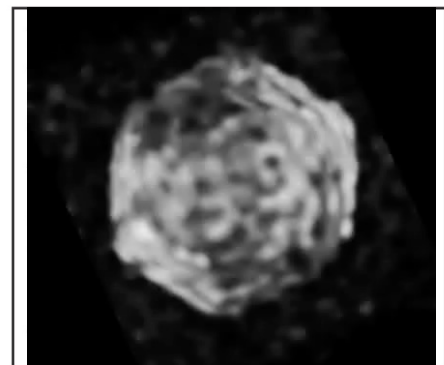
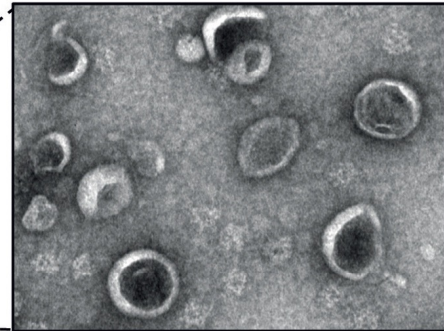
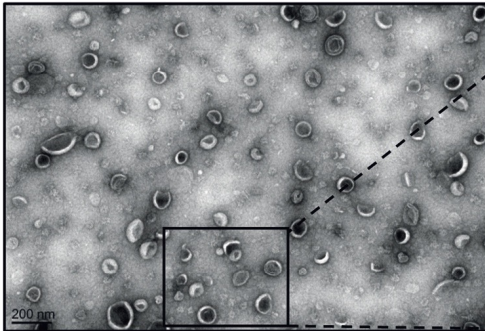
# ➤ Bacteria/host interactions

## Bacterial extracellular vesicles

CMEBA, L. Joanny



Mric, A. Burel, A. Dupont, D. Chrétien



Y. Le Gouar, N. Daniel

## ➤ Conclusion

❖ Microscopy is crucial for microbiologists

❖ Thanks

MIMA2

MRic

G. Jan

Y. Le Loir

Y. Le Gouar

R. Briandet

A. Burel

B. Berkova

S. Even

N. Daniel

T. Meylheuc

D. Chrétien

