



HAL
open science

From animal to plant ecosystems and vice versa

Isabelle Virlogeux-Payant, Matthieu Barret

► **To cite this version:**

Isabelle Virlogeux-Payant, Matthieu Barret. From animal to plant ecosystems and vice versa. 2nd Management Committee & Working Group Meeting of COST Action CA16110 HUPlant Control, Jun 2017, Amersfoort, Netherlands. hal-01608168

HAL Id: hal-01608168

<https://hal.science/hal-01608168v1>

Submitted on 5 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - ShareAlike 4.0 International License



From animal to plant ecosystems and vice versa ?

Isabelle Virlogeux-Payant

INRA, UMR1282 Infectiology and Public Health
« Signaling, Bacterial Carriage and Virulence » team

Matthieu Barret

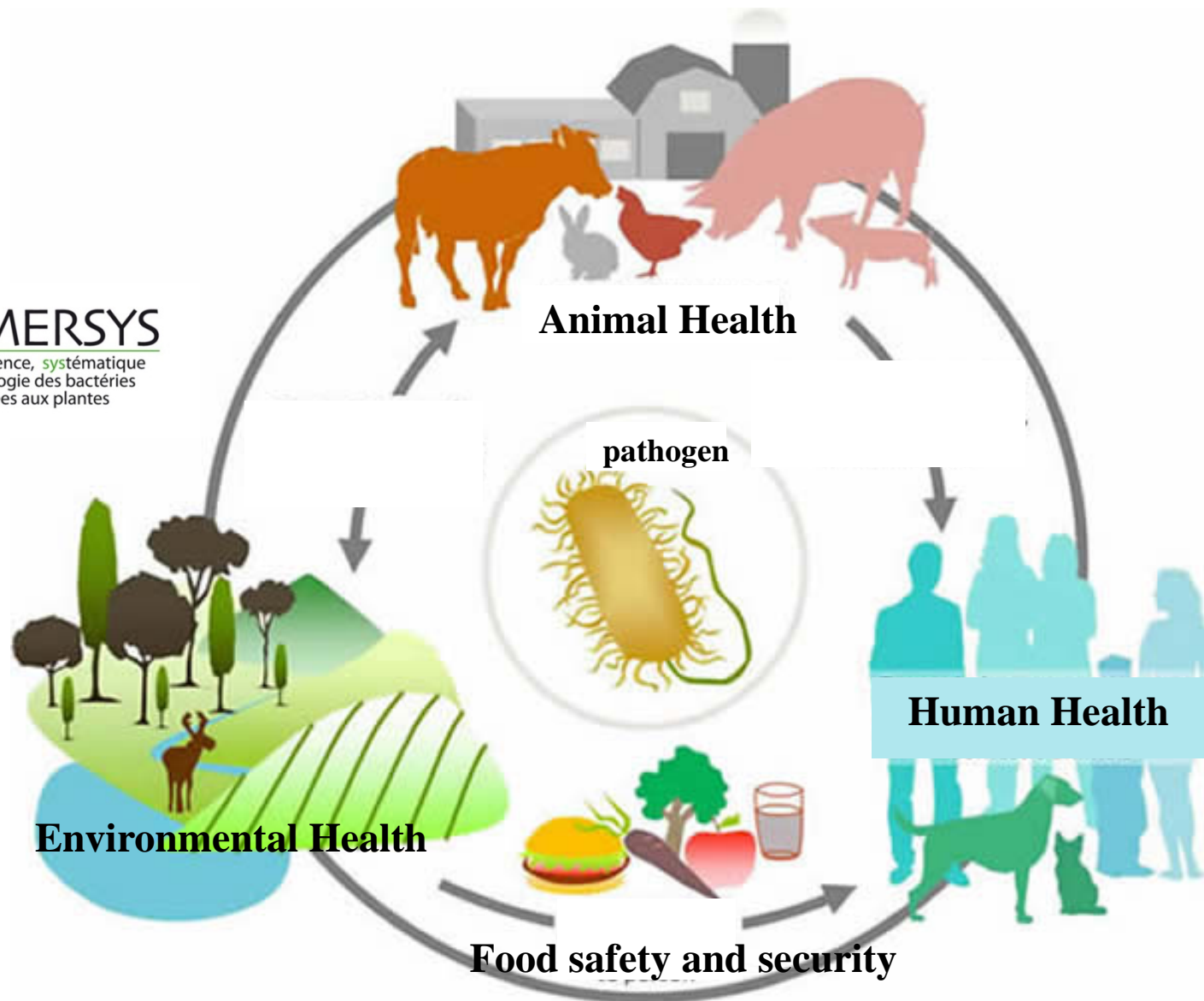
IRHS, Research Institute of Horticulture and Seeds
Emergence, systematics and ecology of plant-associated bacteria

One Health concept

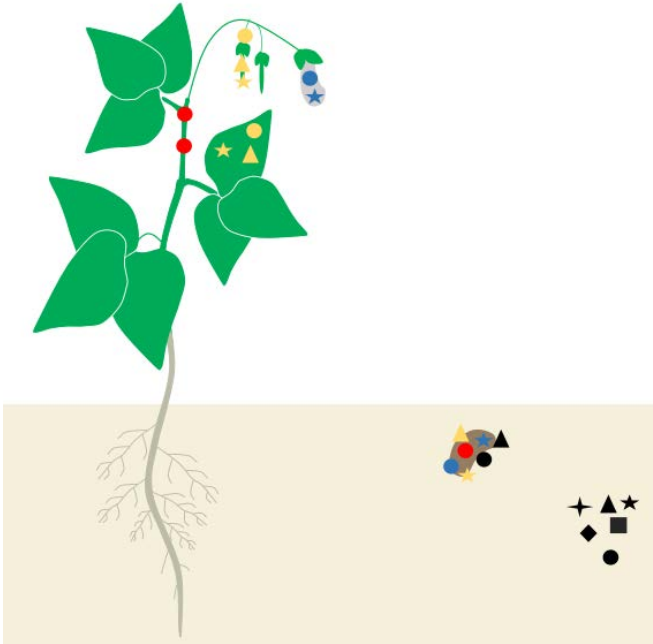


EMERSYS

Emergence, systématique
et écologie des bactéries
associées aux plantes



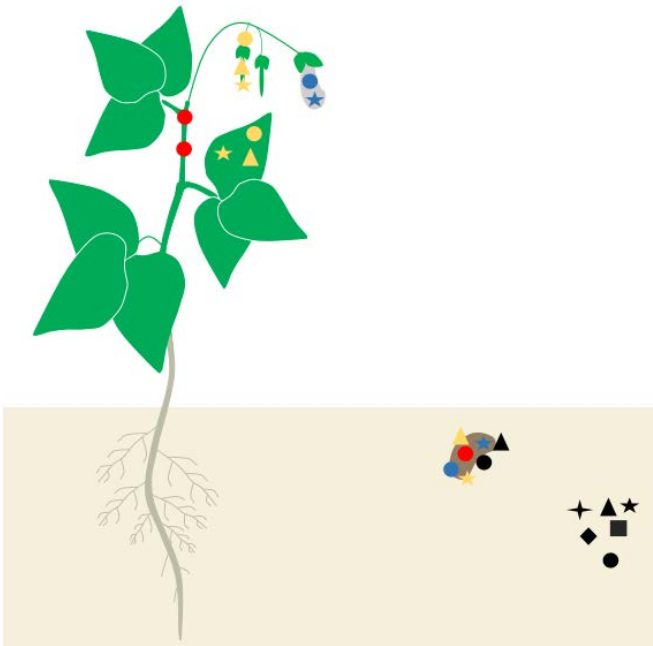
❖ Understand biological/ecological processes involved in seed transmission of microbes



- Pathogen-centric approach (*Xanthomonas*)
 - Seed transmission pathways (systemic, floral)
 - Bacterial determinants (T3SS, adhesins, ...) involved in transmission
- Seed-associated microbial communities (various plant sp.)
 - Ecological processes involved in assembly of seed microbiota
 - Dynamics of seed microbiota during germination and emergence of seedling

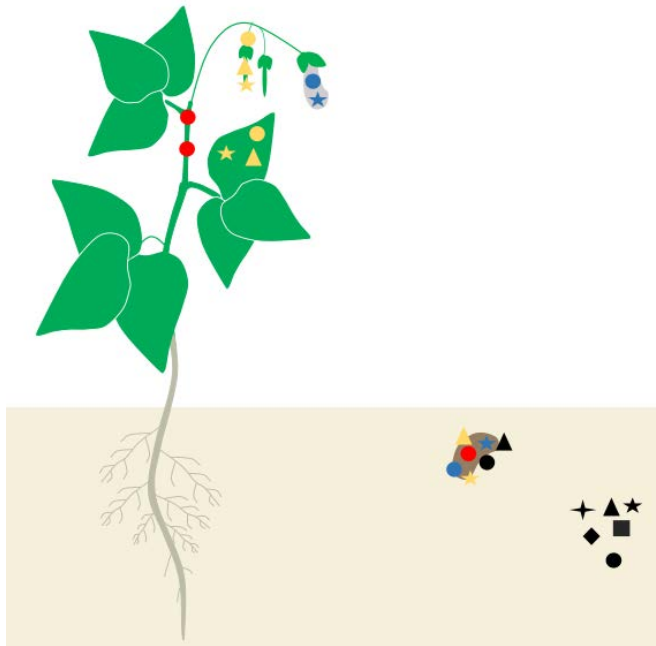
❖ Goal : understand Resistance/resilience of seed microbiota in order to control seed-transmitted pathogens

❖ Skills



- **Microbial Ecology**
 - **Barcoding (16S rRNA gene, ITS1, *gyrB*)**
 - **Metagenomics (taxonomic classif of reads, gene-centric, binning)**
- **Taxonomy**
 - **Strain collection (CIRM-CFBP : 7000 bacterial strains)**
 - **Phylogeny/Phylogenomics/Pop. genomics**
- **Phytopathology (plant-bacterial interactions)**
 - **Greenhouses and growth chamber (S2-S3)**
 - **Plant phenotyping facility (Phenotics) → impact of plant pathogen on various host plants**

❖ Interest in COST HuPlant control

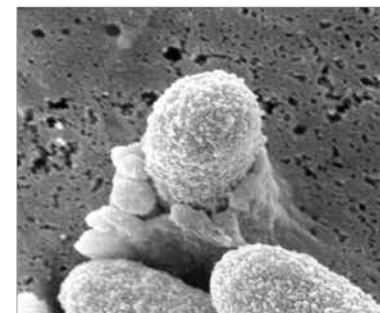
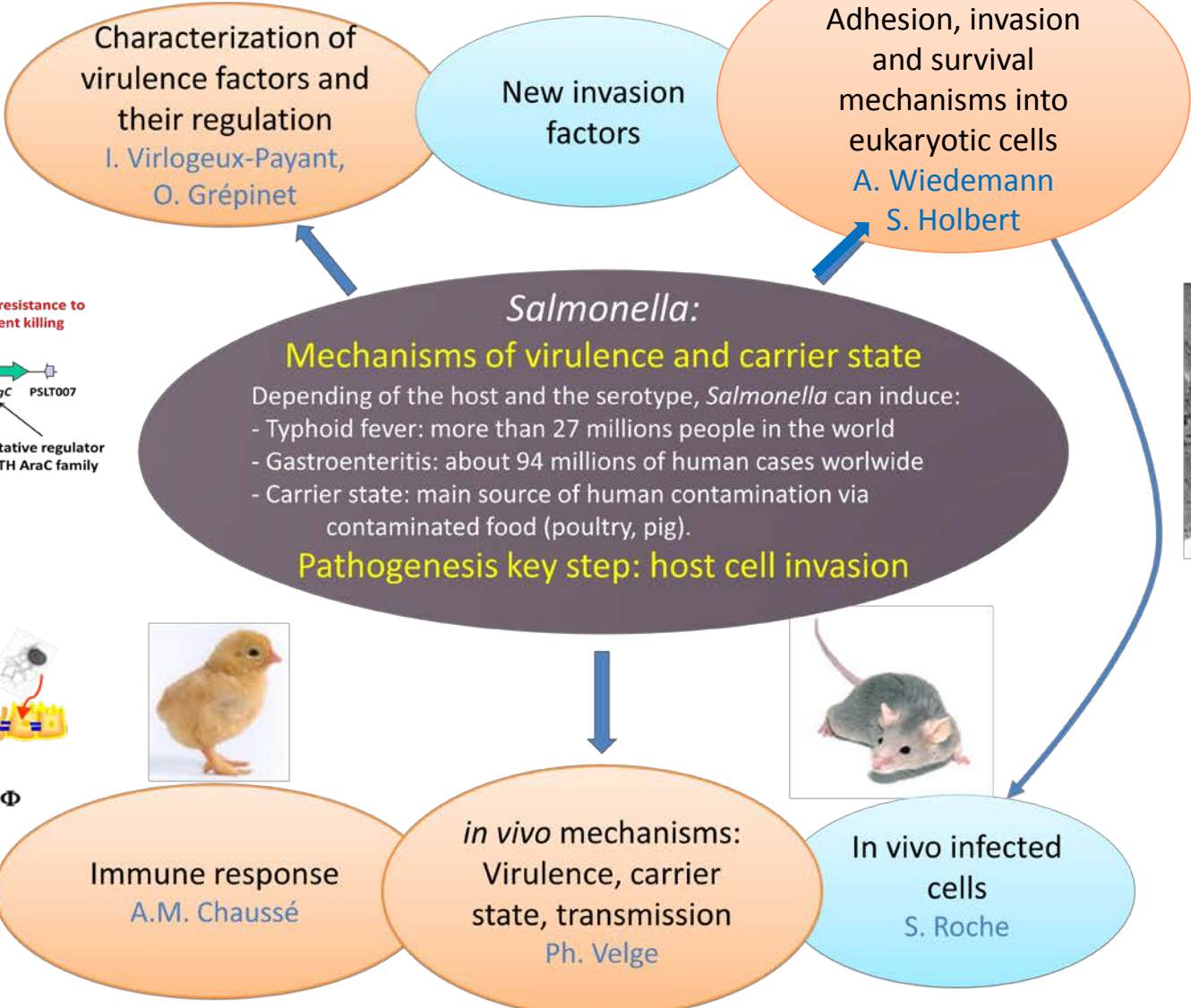
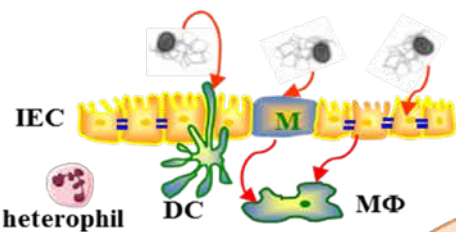
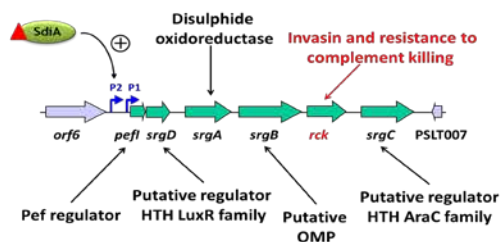


- Response of the seed microbiota to invasion by HPMO

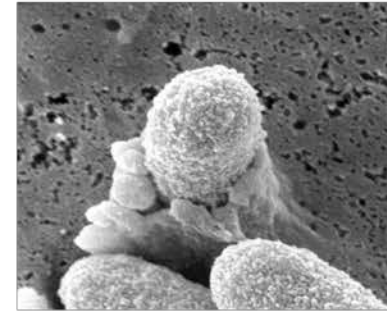
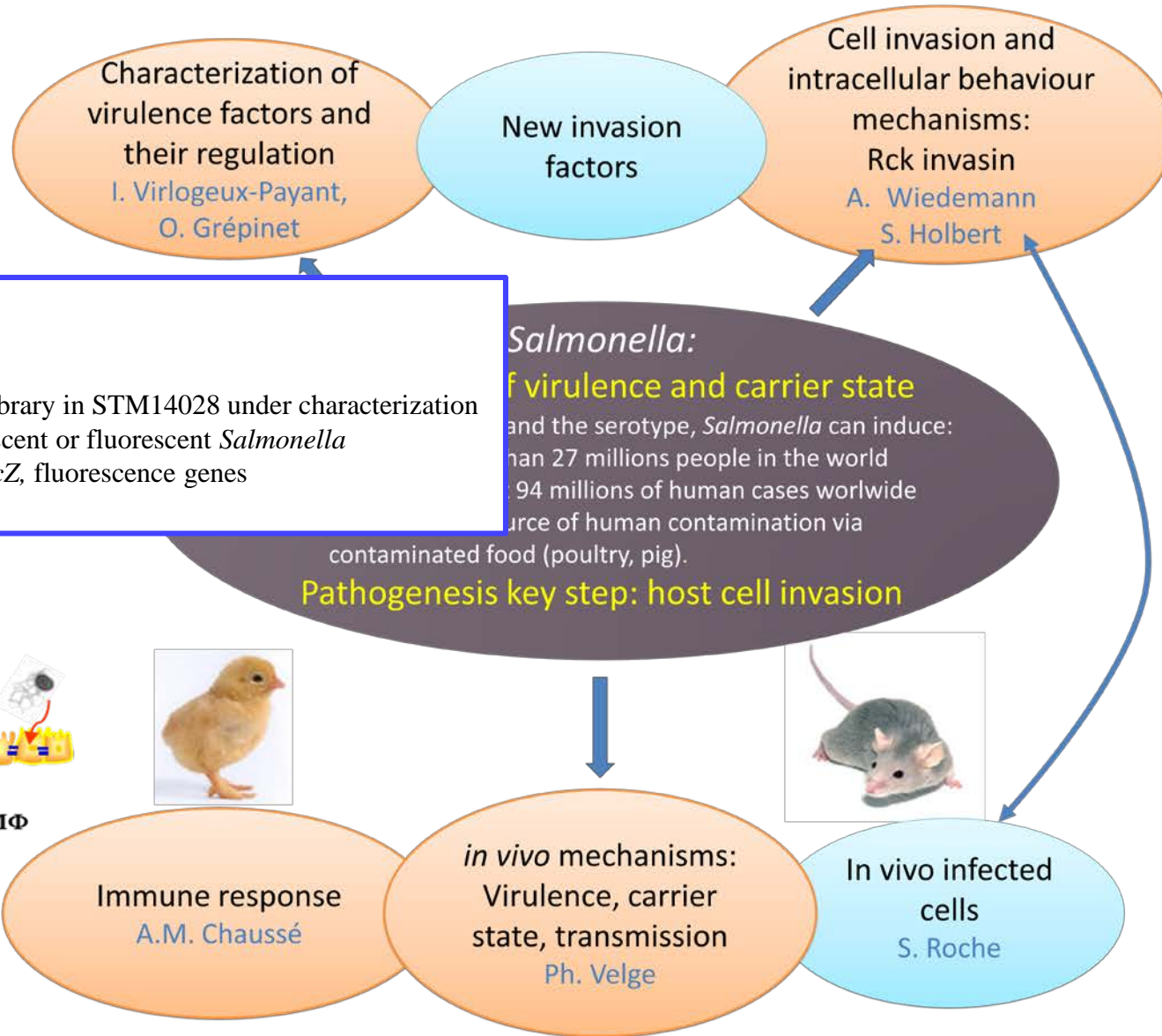
(WG1)

- Seed transmission pathways of HPMO

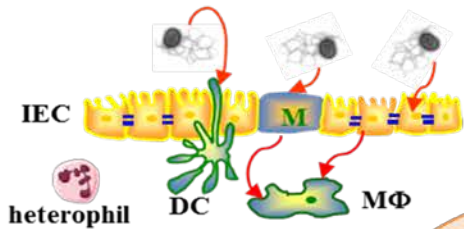
- Taxonomic classification of HPMO (WG2)

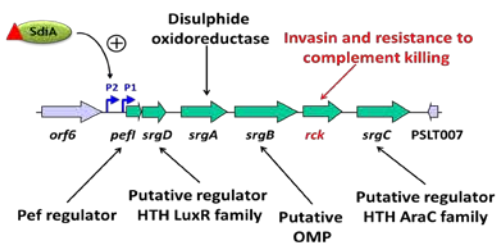
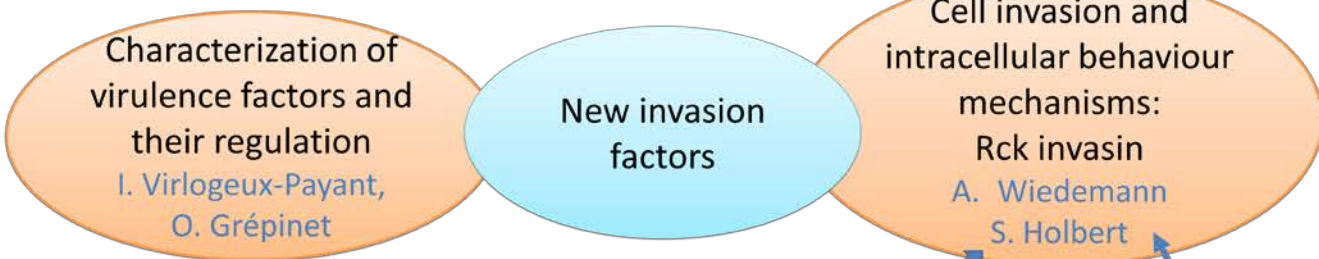


Bacterial genetics



- Mutants in SE, STM
- All genetic manipulations
- qRT-PCR
- Barcode-tagged mutant library in STM14028 under characterization
- Constitutively bioluminescent or fluorescent *Salmonella*
- Gene fusions with *lux*, *lacZ*, fluorescence genes





Salmonella

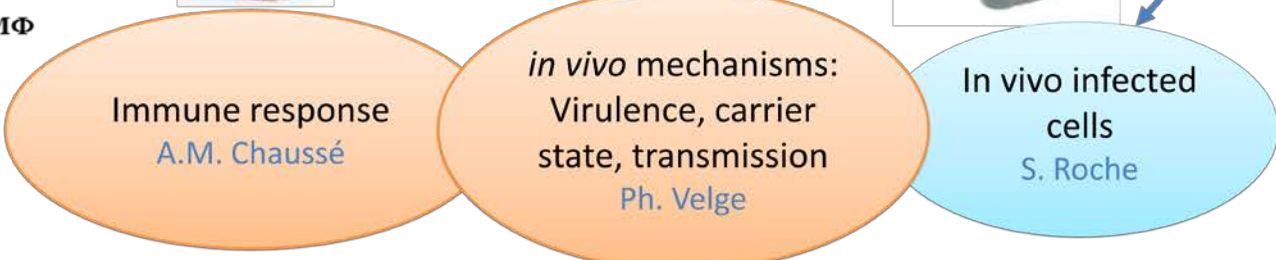
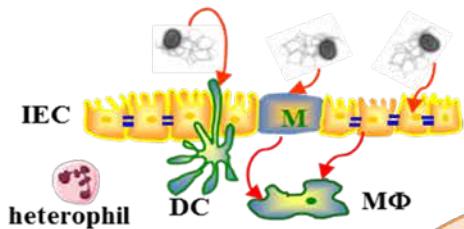
Mechanisms of virulence

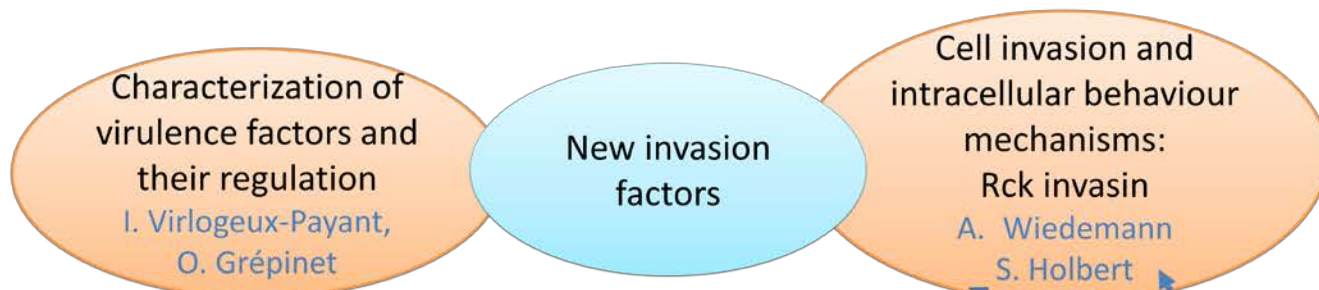
Depending of the host and the serotype

- Typhoid fever: more than 27 million cases worldwide
- Gastroenteritis: about 94 millions of human cases worldwide
- Carrier state: main source of human contamination via contaminated food (poultry, pig).

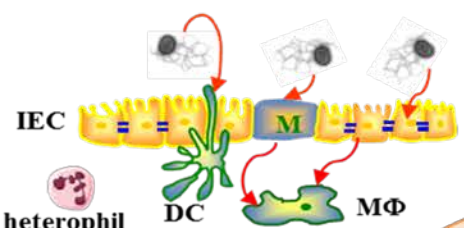
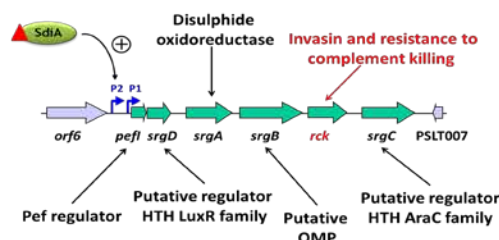
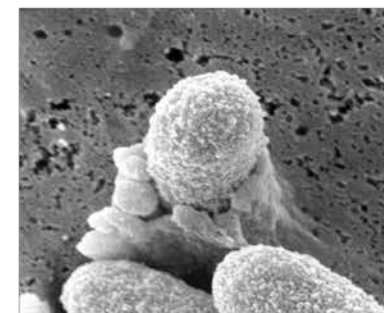
Pathogenesis key step: host cell invasion

- In vitro cell models for adhesion, invasion, immune response studies
- Confocal, electron, Correlative high resolution microscopy
- siRNA
- Cell signaling
- Development of organoid, PCTS models

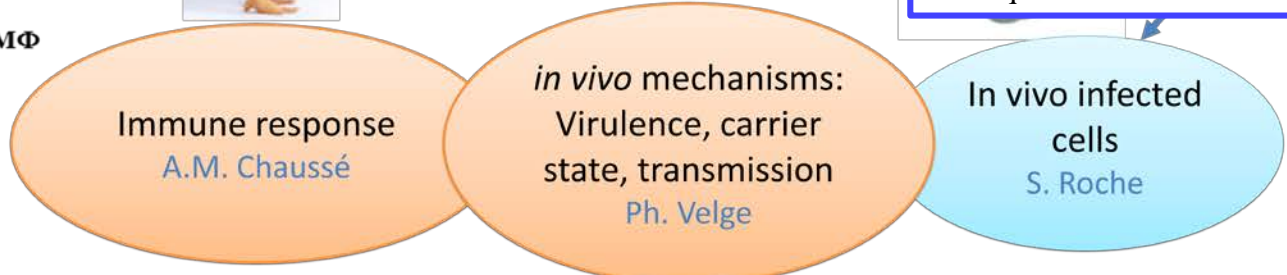


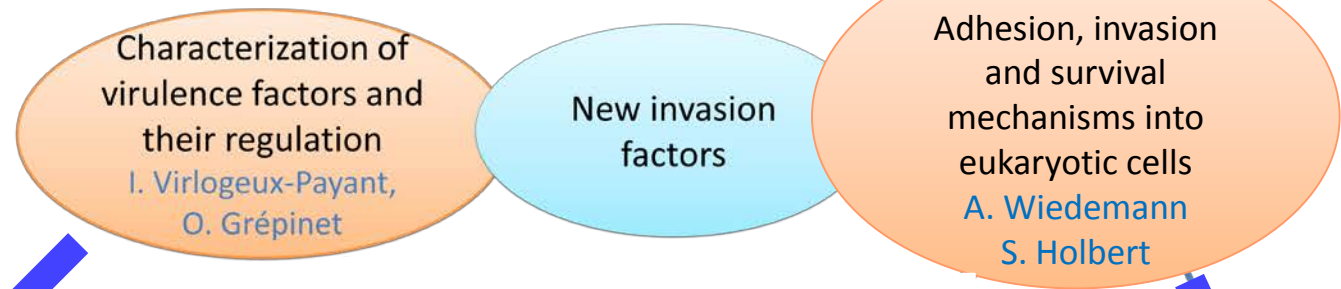


Salmonella:
Mechanisms of virulence and carrier state
 Depending of the host and the serotype, *Salmonella* can induce:
 - Typhoid fever: more than 27 millions people in the world
 - Gastroenteritis: about 94 millions of human cases worldwide
 - Carrier state: main source of human contamination via contaminated food (poultry, pig).
Pathogenesis key step: host cell invasion



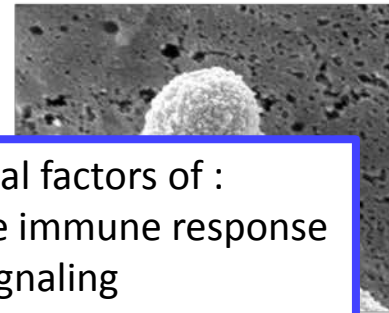
- Chicks and mice animal models including axenic chicks
- In vivo imaging (IVIS spectrum)
- Flow cytometry
- qRT-PCR on immune response (Biomark)





1- Influence of APS environment (quorum-sensing, Microbiota, metabolites) on virulence factors expression
 2- Bacterial genes involved in plant colonization or plant immune response

Salmonella:
 virulence and carrier state
 and the serotype, *Salmonella* can induce:
 an 27 millions people in the
 14 millions of human cases.
 ce of human contaminati
 d (poultry, pig).



Modulation by bacterial factors of :
 - the innate immune response
 - the cell signaling
 Plant/animal comparison

