



# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

**5-6 OCTOBER 2023**  
**INSTITUT PASTEUR, PARIS**



# GENERAL INFORMATION





# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

**5-6 OCTOBER 2023**  
**INSTITUT PASTEUR, PARIS**



## Venue:

Institut Pasteur,  
28 rue du Dr Roux - Paris  
15 Metro « Pasteur »  
Opening and Lunch  
OMICS Building, Agora  
Meeting Room for Session  
Lwoff Building

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Accueil Informations	<b>07</b> Le PASTEUR	<b>13</b> Centre Médical	<b>25</b> Sergent
<b>01</b> Emile DUCLAUX	<b>08</b> Annexe n° 8	<b>14</b> GÉNOPOLE®	<b>26</b> à <b>28</b> François JACOB
<b>02</b> Gabriel BERTRAND	<b>09</b> Pavillon Louis MARTIN	<b>15</b> CIS	
<b>03</b> Ernest FOURNEAU	<b>10</b> Pavillon Emile ROUX	<b>22</b> André LWOFF	
<b>05</b> Serre	<b>11</b> Bâtiment du 205	<b>23</b> Bâtiment Administratif	Parking sous-sol
<b>06</b> Bâtiment Social	<b>12</b> Pasteur BioTop	<b>24</b> Résidence des Stagiaires	Stationnement handicapés
			Défibrillateur

# PROGRAMME





# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

**5-6 OCTOBER 2023**  
**INSTITUT PASTEUR, PARIS**

**5th October, Thursday**

**8.30 am** REGISTRATION

## **OPENING SESSION**

**OMICS BUILDING, AGORA**

**9.45 am** Welcome Address  
**Prof. Fernando ARENZANA-SEISDEDOS**  
Acting Vice-President for International  
Affairs, Institut Pasteur

**Dr Marco VIGNUZZI**  
Senior Principal Investigator, A\*STAR ID  
Labs

**CHAIRS - PROF FERNANDO  
ARENZANA-SEISDEDOS &  
DR MARCO VIGNUZZI**

**10.00 am** Opening Remarks  
**Prof. Christophe D'ENFERT**  
Senior executive Scientific Vice-President,  
Institut Pasteur

**HE Ms Teow Lee FOO**  
Ambassador, Embassy of Singapore (Fce)

**Ms Amanda LOO**  
Deputy Director, A\*STAR ID Labs

**10.20 am** Keynote Speech  
**Dr Rebecca F. GRAIS**  
Executive Director, Pasteur Network

**10.30am** Photo taking session

## **SESSION 1 - RESPIRATORY DISEASES**

**LWOFF BUILDING**

**10.40 am to 12.00 pm**

**CHAIR - PROF LAURENT RENIA**

Speakers:

**Dr Priscille BRODIN**  
Team Head of Chemogenomic of  
intracellular mycobacterium,  
Institut Pasteur de Lille

**Dr Amit SINGHAL**  
Senior Principal Investigator, A\*STAR ID  
Labs

**Dr Matthew TAY**  
Principal Investigator, A\*STAR ID Labs

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**12.00 pm** LUNCH  
OMICS Building, AGORA

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# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

**5-6 OCTOBER 2023**  
**INSTITUT PASTEUR, PARIS**

**5th October, Thursday**

## **SESSION 2 - VECTOR-BORNE DISEASES**

LWOFF BUILDING

**2.00 pm to 5.30 pm**

### **CHAIR - PROF LISA NG**

Speakers:

**Dr Sarah-Hélène MERKLING**

Group Leader, Virology Department,  
Institut Pasteur

**Dr Guillaume CARISSIMO**

Principal Investigator, A\*STAR ID Labs

**Dr Philippe BASTIN**

Head of the Trypanosome Cell Biology Unit,  
Institut Pasteur

**Dr Fok Moon LUM**

Principal Investigator, A\*STAR ID Labs

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**3.20 pm** TEA BREAK AND NETWORKING  
(30 min)

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**Dr Myrielle DUPONT-ROUZEYROL**

Head of URE Dengue et Arboviroses,  
Institut Pasteur de Nouvelle-Calédonie

**Prof. Lisa NG**

Executive Director, A\*STAR ID Labs

**Dr Cassandra KOH**

Member of the Viruses and RNA Interference  
Laboratory, Institut Pasteur

**Prof. Laurent RENIA**

A\*STAR Senior Fellow, A\*STAR ID Labs

**Dr Gary WONG**

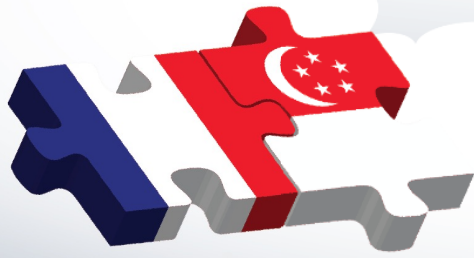
Institut Pasteur du Cambodge

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**5.30 pm** END OF DAY 1

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# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

**5-6 OCTOBER 2023**  
**INSTITUT PASTEUR, PARIS**

**6th October, Friday**

## **SESSION 3 - ANTIMICROBIAL RESISTANCE**

LWOFF BUILDING

9.00 am to 12.20 pm

### **CHAIR - PROF YUE WANG**

Speakers:

**Dr Charles BAROUD**

Head of Physical Microfluidics and  
Bioengineering Laboratory,  
Institut Pasteur

**Dr Pablo BIFANI**

Joint Principal Investigator, A\*STAR ID Labs

**Dr Ivo BONECA**

Head of the Biology and Genetics of Bacterial  
Cell Wall Laboratory, Institut Pasteur

**Dr Teck Hui TEO**

Principal Investigator, A\*STAR ID Labs

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**10.20 am** TEA BREAK

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**Dr Laurent DEBARBIEUX**

Head of Bacteriophage, bacterium,  
host Laboratory, Institut Pasteur

**Prof. Yue WANG**

Senior Principal Investigator, A\*STAR ID Labs

**Dr Nathalie SAUVONNET**

Group Leader of Group Tissue Homeostasis,  
Institut Pasteur

**Dr Soojin JANG**

Head of Antibacterial Resistance Laboratory,  
Discovery Biology, Institut Pasteur Korea

## **CLOSING SESSION**

**12.20 pm**

Closing Remarks

**Prof. Lisa NG**

Executive Director,  
A\*STAR ID Labs

**Prof. Stewart COLE**

President, Institut Pasteur

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**12.40 pm**

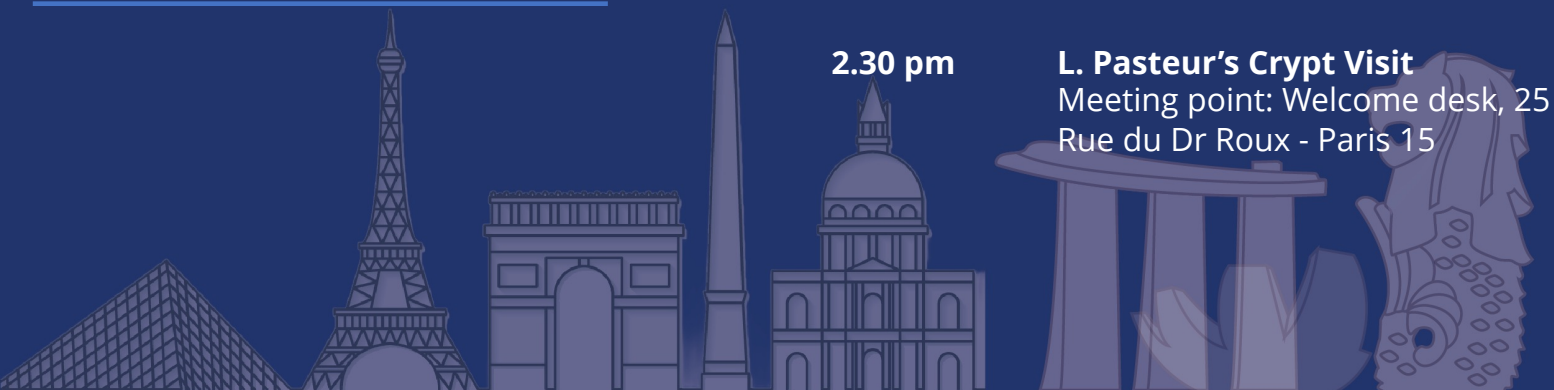
END OF SYMPOSIUM

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**2.30 pm**

**L. Pasteur's Crypt Visit**

Meeting point: Welcome desk, 25  
Rue du Dr Roux - Paris 15



# SPEAKERS







# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

**5-6 OCTOBER 2023**  
**INSTITUT PASTEUR, PARIS**

## Speakers – Session 1 Respiratory Diseases



**Dr Priscille BRODIN**

**Team Head of Chemogenomic of intracellular mycobacterium  
Institut Pasteur de Lille**

**Talk Title: Exploiting host-pathogen interactions for innovative TB  
drug development**

### **Biosketch:**

P. Brodin has been studying *Mycobacterium tuberculosis* -host relationships over the last 20 years. P. Brodin was recipient of the ERC grant INTRACELLTB and has been involved in several EU consortium projects (TB-VIR, MM4TB, CycloNHit, MTI4MDRTB and ERA4TB) around axes focused on *M. tuberculosis* colonization of host cells and TB drug discovery. She co-authors more than 100 publications and is inventor on several patents including Telacebec. She was Laureate of the Sanofi Junior Prize and the EMBO Young Investigator Program.





# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

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INSTITUT PASTEUR, PARIS

## Speakers – Session 1 Respiratory Diseases

### Dr Priscille BRODIN

**Abstract:** Mycobacteria are microbes responsible for severe infectious diseases, including tuberculosis, leprosy and Buruli ulcer, affecting millions of people around the world each year. To combat these diseases, it is necessary to understand the strategies elaborated by these bacteria to invade the target cells of the body, and survive in them. This current research aims to elucidate these molecular strategies employed by *Mycobacterium tuberculosis*, following these two axes of research: 1) understanding the early stages of infection by the bacillus, involving notably the interactions with lung-specific cells such as pneumocytes and 2) understanding the growth mechanisms of the bacillus within alveolar macrophages recruited during the inflammation stage following infection. The methods rely 1) on cell-based and reconstituted lung-on-a-chip models coupled with dynamic confocal imaging and unbiased genetic knockdowns and 2) on *in vivo* models for the testing of novel drug candidates using nanoparticle-based delivery systems with intrinsic host directed properties. In the long term, these approaches will be deployed to enrich the current therapeutic panoply of drugs for the compassionate use in TB patients.





# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

**5-6 OCTOBER 2023**  
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## Speakers – Session 1 Respiratory Diseases



**Dr Amit SINGHAL**  
**Senior Principal Investigator, A\*STAR ID Labs**

### **Talk Title: Investigating host-pathogen interface for designing interventions**

**Biosketch:** My laboratory studies host-pathogen interaction taking *M. tuberculosis* as a model microorganism. We apply various omics approaches to dissect the modulation in host immunometabolic circuits upon infection and to understand the mechanisms utilized by bacteria for evading immune defense system. We utilize patient samples, in vitro and animal models for TB i.e. mouse and Rat model, the model which I developed while working at Institute Pasteur, Brussels and Novartis. Our goal is to carry fundamental and modern translational immunological research in human populations and to establish clinically relevant interventions in infectious diseases.





# A\*STAR ID LABS – PASTEUR JOINT SYMPOSIUM

**5-6 OCTOBER 2023**  
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## Speakers – Session 1 Respiratory Diseases



**Dr Matthew TAY**  
**Principal Investigator, A\*STAR ID Labs**

**Talk Title: Investigation of functional antibody-antigen interactions via droplet microfluidics**

### **Biosketch:**

Dr Tay graduated in Immunology from Brown University, USA, in 2012. He then obtained his PhD at Duke University, USA in 2018, where he studied the effector functions of antibodies against HIV-1. He continued his work as a postdoctoral fellow at the Singapore Immunology Network (SIgN), A\*STAR, where he continued research work on antibodies, malaria, and subsequently SARS-CoV-2. In 2020, he moved from SIgN to the newly founded A\*STAR Infectious Diseases Labs (A\*STAR ID Labs).







# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

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## Speakers – Session 2 Vector-Borne Diseases



**Dr Sarah-Hélène MERKLING**  
**Group Leader, Virology Department,**  
**Institut Pasteur**

**Talk Title: Mosquito-Virus Interactions : Stories of a journey from the field to single-cells**

### **Biosketch:**

Sarah Merkling is currently a group leader within the Virology Department at Institut Pasteur. She started her career studying insect immunity in *Drosophila*, and is now aiming to understand antiviral immunity in *Aedes aegypti* mosquitoes, the main vectors of arboviruses such as Dengue virus, Zika virus, or Chikungunya. She is a laureate of the l'Oreal-UNESCO For Women in Science Award, and has recently obtained an ERC Starting grant to further develop the research she will present to you today





# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

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## Speakers – Session 2 Vector-Borne Diseases

### **Dr Sarah-Hélène MERKLING**

**Abstract:** Dengue viruses cause more human disease than any other arthropod-borne virus. Host-pathogen interactions between the four dengue virus serotypes (DENV-1,-2,-3,-4) and their main mosquito vector *Aedes aegypti* are poorly understood. Specifically, genetic factors underlying variation in the natural susceptibility of mosquitoes to DENV infection remain poorly characterized, despite their fundamental and epidemiological importance.

We identified a mosquito population from Gabon that is naturally resistant to infection by DENV. Using a transcriptomic approach, we identified a set of genes associated with virus resistance, amongst which was a P450 cytochrome protein. We confirmed its antiviral role using a set of genetic tools such as gene knockdown and gene overexpression *in vivo*, and found that a set of natural polymorphisms in the gene locus impacted DENV resistance. To further characterise the molecular mechanisms underlying mosquito-virus interactions in the midgut, we are developing a set of state-of-the-art tools such as multiplex RNA-FISH and single-cell transcriptomics. They allow us to study mosquito tissues at the unprecedented resolution of single cells and unravel the molecular basis of natural resistance phenotypes towards DENV infection in field mosquitoes.







# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

**5-6 OCTOBER 2023**  
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## Speakers – Session 2 Respiratory Diseases



**Dr Guillaume CARISSIMO**  
**Principal Investigator, A\*STAR ID Labs**

**Talk Title: Comparative alphavirus host hijacking or antiviral and immunomodulatory targets**

### **Biosketch:**

Guillaume Carissimo obtained his PhD in 2014 from Université Pierre et Marie Curie (Sorbonne Universities) and Pasteur Institute in Paris, where he used functional genomics to study Anopheles and Aedes mosquito antiviral immunity to arboviruses and Plasmodium parasites in vivo. During his PhD, he characterized the contribution of different immune pathways in several mosquito compartments, the opposite contribution of microbiota in vector competence and discovered novel insect specific viruses. He then joined the laboratory of Professor Lisa F.P. Ng at the Singapore Immunology Network, A\*STAR, to study the mammalian side of antiviral immunity. He has also been involved in developing tools and novel approaches to better understand host factors interplay with viral replication and immune response both in vitro and in animal models. Guillaume Carissimo participated in the national COVID-19 research efforts alongside ID Labs members and published several research articles on the immune response dysregulation during SARS-CoV-2 infection. Guillaume Carissimo obtained the NMRC-Young Investigator Research Grant in November 2020 to study virus host hijacking using multiOmics strategies, and was appointed Investigator in April 2021 to lead the Host Pathogens Interactions lab within the Infectious Disease Laboratories research institute of A\*STAR.



# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

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## Speakers – Session 2 Vector-Borne Diseases

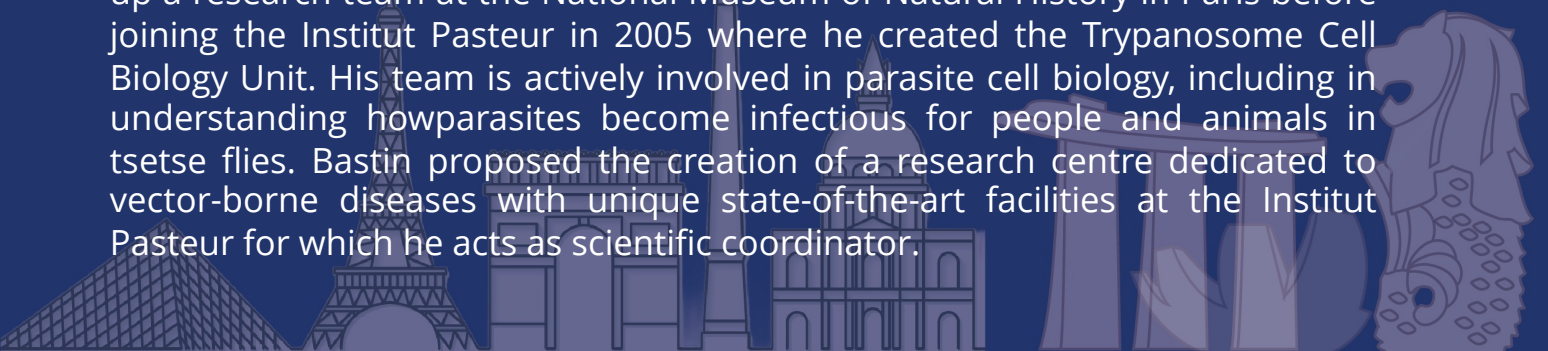


**Dr Philippe BASTIN**  
**Head of the Trypanosome Cell Biology Unit**  
**Institut Pasteur**

**Talk Title: Single cell RNA sequencing decodes how trypanosomes become infectious in the salivary gland of the tsetse fly**

### **Biosketch:**

Philippe Bastin grew up in the Belgian countryside where he developed interest for life sciences. He studied biology at Namur, Louvain and Brussels where he completed his doctoral studies in 1993 at the de Duve Institute. He studied a cell surface receptor in the parasitic protist *Trypanosoma brucei* (responsible for sleeping sickness) and identified vaccine candidates (SmithKline Beecham award in 1991). He then moved to Manchester (UK) in 1994 as an International Wellcome trust fellow to be trained in genetics, molecular biology and advanced microscopy with Keith Gull. A major achievement was the serendipitous discovery of RNA interference in trypanosomes and its exploitation to reveal the function of an enigmatic structure in the parasite flagellum. In 2000, he got an Inserm position and set up a research team at the National Muséum of Natural History in Paris before joining the Institut Pasteur in 2005 where he created the Trypanosome Cell Biology Unit. His team is actively involved in parasite cell biology, including in understanding how parasites become infectious for people and animals in tsetse flies. Bastin proposed the creation of a research centre dedicated to vector-borne diseases with unique state-of-the-art facilities at the Institut Pasteur for which he acts as scientific coordinator.





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## Speakers – Session 2 Vector-Borne Diseases

### **Dr Philippe BASTIN**

**Abstract:** African trypanosomes are parasites responsible for sleeping sickness in humans and nagana in cattle. They are transmitted by the bite of the tsetse fly, where they develop in different tissues before gaining mammalian infectivity in the salivary glands. A key step in this process is the establishment of monoallelic variant surface glycoprotein (VSG) expression and the formation of the VSG coat that protects them against the host immune response. They possess thousands of VSG genes but only one is expressed at a time. The establishment of VSG monoallelic expression is poorly understood, due to the multiple parasite stages present in the salivary glands. Therefore, we performed single-cell RNA-sequencing (scRNA-seq) on these parasite populations. We were able to capture the full developmental programme of trypanosomes in the salivary glands. Analysis of VSG gene expression revealed a dynamic VSG gene activation program. Strikingly, we found that immature cells contain transcripts from multiple VSG genes, which resolves to singular VSG gene expression in mature parasites. Single molecule RNA fluorescence in situ hybridisation (smRNA-FISH) of VSG gene expression confirmed this finding. Our data demonstrate that multiple VSG genes are transcribed before a single gene is chosen. We propose a transcriptional race model governs the initiation of monoallelic expression.







# A\*STAR ID LABS – PASTEUR JOINT SYMPOSIUM

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## Speakers – Session 2 Vector-Borne Diseases



**Dr Fok Moon LUM**  
**Principal Investigator, A\*STAR ID Labs**

**Talk Title: Investigating viral-neuro-immune dynamics in arboviral infections**

**Biosketch:**

Fok-Moon Lum graduated from the Singapore National University of Singapore with a Degree in Biomedical Sciences. Following, he was awarded the President's Graduate Fellowship from the National University of Singapore for his Ph.D., which he did at the Singapore Immunology Network in A\*STAR with Professor Lisa Ng. He was instrumental in setting up the murine models of several clinically important arboviruses and using these models, he elucidated the host immune responses to chikungunya virus. Fok-Moon was also awarded the prestigious France-Singapore Merlion Fellowship during his Ph.D. allowing him to perform research in an overseas collaborator's lab.





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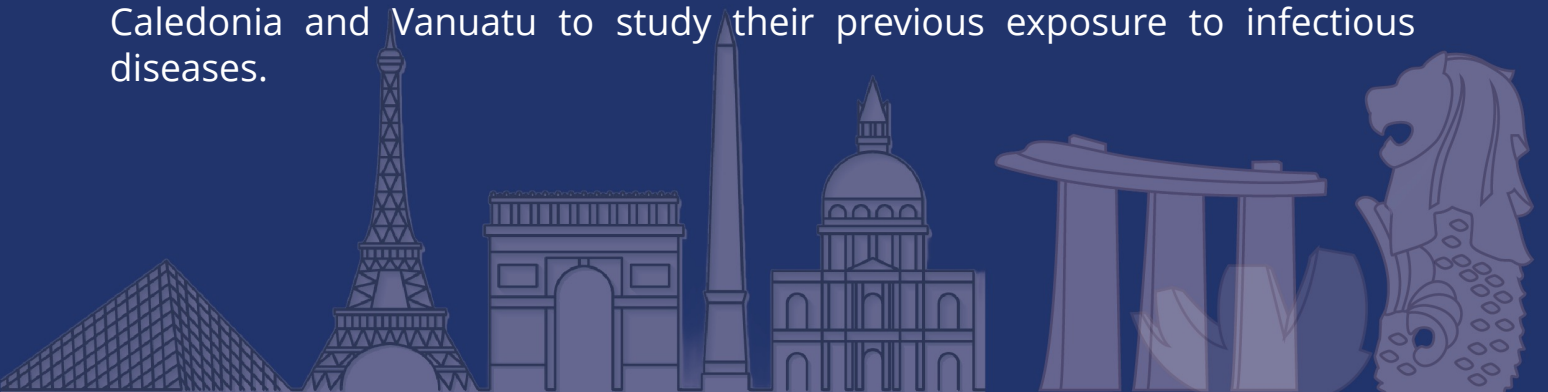


**Dr Myrielle DUPONT-ROUZEYROL**  
**Head of URE Dengue et Arboviroses,**  
**Institut Pasteur de Nouvelle-Calédonie**

**Talk Title: Arboviruses and the Pacific region, what's up?**

### **Biosketch:**

My aim is to decipher the specific relations between viruses and their variety of hosts in the specific insular environment of New Caledonia. For this purpose, in the past years, I have conducted research to understand the phylodynamic of arbovirus circulation in New Caledonia and the Pacific region. We also identified specific factors at the origin of outbreaks and their importance for dengue virus vector-driven selection. Currently, we are investigating dengue virus evolution in *Aedes aegypti* driven by Wolbachia-selective pressure in the framework of the World Mosquito Program, to guide the Wolbachia strategy application. In addition, we are deploying research projects linked to the specific populations of New Caledonia and Vanuatu to study their previous exposure to infectious diseases.





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## Speakers – Session 2 Vector-Borne Diseases

### **Dr Myrielle DUPONT-ROUZEYROL**

**Abstract:** African trypanosomes are parasites responsible for sleeping sickness in humans and nagana in cattle. They are transmitted by the bite of the tsetse fly, where they develop in different tissues before gaining mammalian infectivity in the salivary glands. A key step in this process is the establishment of monoallelic variant surface glycoprotein (VSG) expression and the formation of the VSG coat that protects them against the host immune response. They possess thousands of VSG genes but only one is expressed at a time. The establishment of VSG monoallelic expression is poorly understood, due to the multiple parasite stages present in the salivary glands. Therefore, we performed single-cell RNA-sequencing (scRNA-seq) on these parasite populations. We were able to capture the full developmental programme of trypanosomes in the salivary glands. Analysis of VSG gene expression revealed a dynamic VSG gene activation program. Strikingly, we found that immature cells contain transcripts from multiple VSG genes, which resolves to singular VSG gene expression in mature parasites. Single molecule RNA fluorescence in situ hybridisation (smRNA-FISH) of VSG gene expression confirmed this finding. Our data demonstrate that multiple VSG genes are transcribed before a single gene is chosen. We propose a transcriptional race model governs the initiation of monoallelic expression.







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## Speakers – Session 2 Vector-Borne Diseases



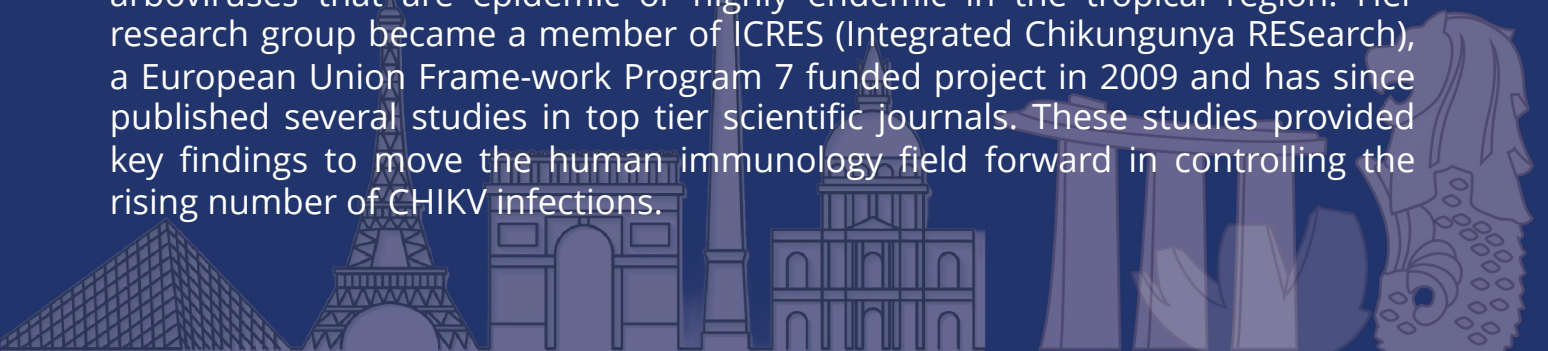
**Prof. Lisa NG**  
**Executive Director, A\*STAR ID Labs**

### **Talk Title: Infection And Immunity to Viral Diseases**

#### **Biosketch:**

Lisa graduated in Biochemistry from the University of Manchester Institute of Science and Technology (UMIST) in the United Kingdom in 1995. She then obtained her PhD in Molecular Virology in coronaviruses from the National University of Singapore (NUS) in 2002. After joining the Genome Institute of Singapore (GIS) in 2002 as a post-doctoral fellow, Lisa has made significant scientific contributions to the field where she worked on viral diseases such as hepatitis, SARS and influenza. Her contributions involved academia to public health in developing a framework to deliver broad-range capability for disease preparedness.

She is currently the Executive Director and Senior Principal Investigator at A\*STAR Infectious Diseases Labs (ID Lab), and the research interest of her group (Microbial Immunity Lab) focuses on the immune responses of arthritic arboviruses that are epidemic or highly endemic in the tropical region. Her research group became a member of ICRES (Integrated Chikungunya REsearch), a European Union Frame-work Program 7 funded project in 2009 and has since published several studies in top tier scientific journals. These studies provided key findings to move the human immunology field forward in controlling the rising number of CHIKV infections.





# A\*STAR ID LABS – PASTEUR JOINT SYMPOSIUM

**5–6 OCTOBER 2023**  
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## Speakers – Session 2 Vector-Borne Diseases



**Dr Cassandra KOH**  
**Member of the Viruses and RNA Interference Laboratory**  
**Institut Pasteur**

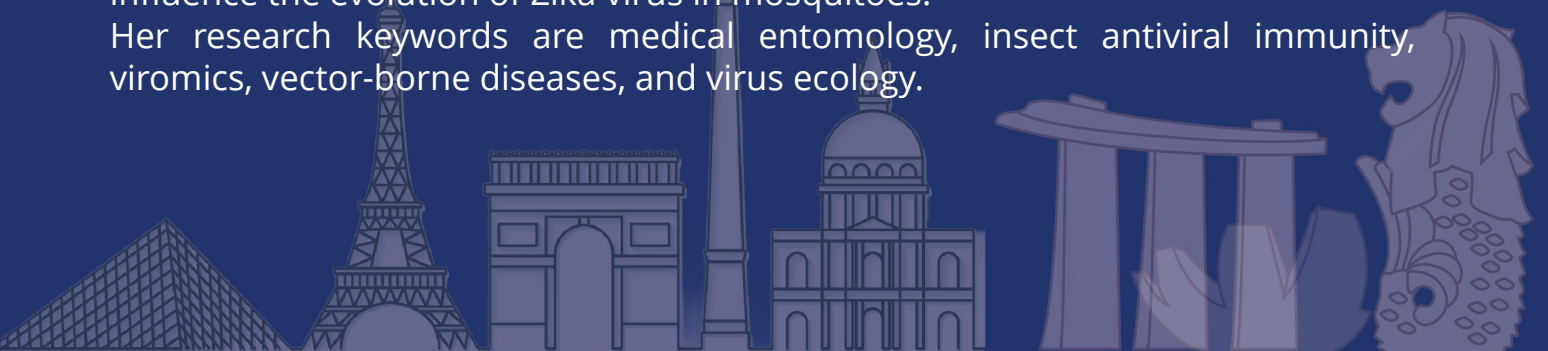
**Talk Title: Mosquito-Specific Viruses and Their Impact on Arbovirus Disease Ecology**

### **Biosketch:**

Cassandra Koh is a Postdoctoral Research Fellow in the Viruses and RNA Interference Unit, headed by Prof. Dr. Carla Saleh at Institut Pasteur, France. She obtained her Doctorate degree at Monash University, Australia, in 2019 under the supervision of Prof. Dr. Elizabeth McGraw. During her PhD, she investigated genetic and metabolic factors influencing the vector competence of *Aedes aegypti* mosquitoes for dengue virus, and the effects of *Wolbachia*—an antiviral endosymbiont now utilized as a biological control measure against arboviral diseases.

In 2022, she was awarded the Springboard to Independence Fellowship from the Agence Nationale de la Recherche to study how mosquito-specific viruses may influence the evolution of Zika virus in mosquitoes.

Her research keywords are medical entomology, insect antiviral immunity, viromics, vector-borne diseases, and virus ecology.





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## Speakers – Session 2 Vector-Borne Diseases

### **Dr Cassandra KOH**

**Abstract:** Mosquitoes transmit arthropod-borne viruses (arboviruses), which are responsible for 17% of the global burden of infectious diseases in humans. The viral community of the mosquito microbiota also includes mosquito-specific viruses, which do not infect vertebrate cells. The diversity and prevalence of these viruses overshadow those of their medically relevant counterparts. They will not only change our understanding of how mosquito antiviral immunity works but also serve as the basis for innovations in arboviral disease management and vector control. This is because some mosquito-specific viruses enhance or suppress the replication and dissemination of arboviruses in mosquitoes. This talk will focus on the Palm Creek virus, a mosquito-specific flavivirus found to inhibit the replication of co-infecting flaviviruses but not alphaviruses. We tested the robustness of this phenotype using Zika and chikungunya viruses. Finding only mild suppression against Zika virus, we also investigated whether observed inhibition from past studies was mediated by the RNA interference antiviral machinery. Our analysis points towards alternative underlying mechanisms. These observations demonstrate that there is much work to be done in elucidating virus-virus interactions in insect vectors, a topic that would have great implications on arboviral disease management through a One Health perspective.







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## Speakers – Session 2 Vector-Borne Diseases



**Prof. Laurent RENIA**  
**A\*STAR Senior Fellow, A\*STAR ID Labs**

### **Talk Title: Plasmodium vivax and zoonosis malaria**

#### **Biography:**

Laurent Renia obtained his PhD in 1991 from University Pierre et Marie Curie (now Sorbonne University) in Paris, France and did his post-doctoral New York University (1991-1992). He then returned to Paris in 1993 where he obtained a permanent position as junior research scientist at the French National Institute of Health (INSERM) in the INSERM Unit 313 at the Hopital Pitie-Salpetriere in Paris. He moved to the INSERM Unit 445 at the Institut Cochin in Paris where he started his own group in 1997. Between 2001-2006, he became research director at INSERM, co-director and director of the Department of Immunology at the Institut Cochin. He joined SigN in 2007. He was Executive Director from 2013 to 2020. He was also the founding Executive Director of the A\*STAR ID Labs (A\*STAR) from 2020 to 2021. He is now Professor of infectious Diseases and director of the respiratory and Infectious Diseases Program in Lee Kong Chian School of Medicine, Nanyang Technological University. He is also a Professor in the School of Biological Sciences at NTU and a senior fellow and principal investigator of the A\*STAR ID Labs. He holds adjunct position to the French National Institute of Health (INSERM). He has published more than 330 articles and book chapters. He is an Academic Editor for Infection and Immunity, PLoS ONE, Infection and Immunity, Microbial Pathogenesis, Microbial cell and Frontiers in Immunology.



# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

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## Speakers – Session 2 Vector-Borne Diseases



**Dr Gary WONG**  
**Senior Researcher, Institut Pasteur du Cambodge**

### **Talk Title: Novel pathogen discovery in the Greater Mekong Subregion**

#### **Biography:**

I am currently a Senior Researcher at the Virology Unit, Institut Pasteur du Cambodge. I was a Professor and Principal Investigator at the former Institut Pasteur of Shanghai, where I led the Viral Hemorrhagic Fevers Research Unit. My research interests include the establishment of rapid, sensitive and specific methods for on-site diagnostics, the development of animal models, vaccines and therapeutics, as well as research into mechanisms of pathogenicity for Biosafety Level (BSL) -3 or -4 viruses causing viral hemorrhagic fevers in humans, with focus on bunyaviruses (i.e. Crimean-Congo Hemorrhagic Fever virus, Severe Fever with Thrombocytopenia Syndrome virus, Hantavirus), as well as Nipah virus and filoviruses (i.e. Ebola, Marburg). I am experienced with field studies and interested in discovering and characterizing novel pathogens, specifically those with zoonotic origins in the Greater Mekong Subregion, as well as analyzing risk factors contributing to their emergence in animals and humans.





# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

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## Speakers – Session 3 Antimicrobial Resistance

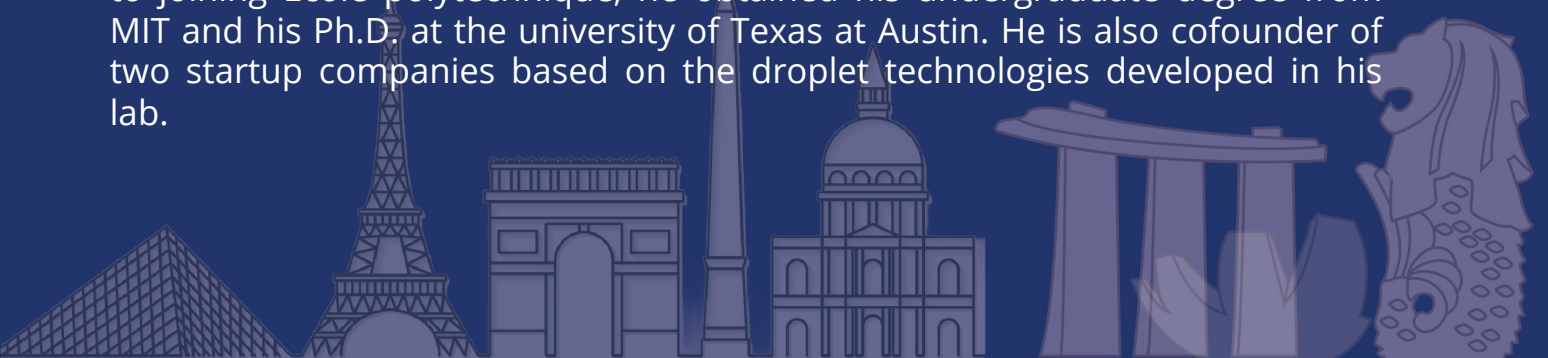


**Dr Charles BAROUD**  
**Head of Physical Microfluidics and Bioengineering Laboratory**  
**Institut Pasteur**

**Talk Title: Evaluating single-cell antibiotic susceptibility using stationary microfluidic droplets**

### **Biosketch:**

Charles N. Baroud is professor at the department of mechanics at Ecole Polytechnique (Paris, France), which he joined in 2001. There he founded the microfluidics activity at the Laboratoire d'Hydrodynamique (LadHyX) where his research activity centered on fundamental problems of multiphase flows as well as droplet microfluidic technology development. In 2012, he was awarded an ERC grant to refocus his activity toward addressing biological questions in droplet microfluidics. This work led to ongoing applications for microbiology and for 3D cell culture problems. Since 2018, he also leads a research group at Institut Pasteur in Paris where the biological activities are being pursued. Prior to joining École polytechnique, he obtained his undergraduate degree from MIT and his Ph.D. at the university of Texas at Austin. He is also cofounder of two startup companies based on the droplet technologies developed in his lab.







# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

**5-6 OCTOBER 2023**  
**INSTITUT PASTEUR, PARIS**

## Speakers – Session 3 Antimicrobial Resistance

### **Dr Charles BAROUD**

**Abstract:** Identifying the response of individual bacterial cells to an antibiotic stress will lead to improved detection and understanding of the antibiotic resistance. To date, neither bulk nor single-cell methods are able to link the heterogeneity of single-cell susceptibility to the population-scale response to antibiotics. I will present a platform that measures the ability of individual *E. coli* cells to form small colonies at different antibiotic concentrations, based on anchored microfluidic drops and specialized image and data analysis pipelines. The experimental likelihood of a single cell to form a colony is measured to provide a probabilistic antibiotic susceptibility curve. In addition to the probabilistic viewpoint, the imaging approach enables the characterization of morphological features that help characterize how individual cells escape the antibiotic pressure at sub-lethal concentrations. When the pipeline is applied to different classes of antibiotics, we observe a range of different cellular morphologies and growth dynamics. Current work is focused on building a mathematical model that may link the statistical and dynamic readouts.





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## Speakers – Session 3 Antimicrobial Resistance



**Dr Pablo BIFANI**  
**Joint Principal Investigator, A\*STAR ID Labs**

### **Talk Title: Compassionate or standard-of-care combination phage therapy?**

#### **Biosketch:**

Pablo Bifani completed his PhD at the Sackler Institute of Graduate Biomedical Sciences, New York University, USA, in 2000, on the Molecular Epidemiology of Drug Resistance Mycobacterium tuberculosis. He continued his work on tuberculosis at the Pasteur Institute of Lille, France as a postdoctoral fellow in 2000-2001. From 2001 to 2004, he was a Principal Investigator at the Pasteur Institute of Lille and the Scientific Director for Europe of Regma/ PhageGen working on tuberculosis (TB) and anthrax Phage Therapy and Diagnostics. In 2005, he established the Laboratory of Molecular Pathology of Mycobacteria at the Pasteur Institute of Brussels, Belgium (currently the Institute of Public Health). He joined Novartis Institute for Tropical Diseases (NITD) in Singapore in 2008, where he first led the TB drug discovery “Hit to Lead” team, and in 2011, he established and headed the Malaria Biology team until 2017. Since 2017, Pablo holds joint appointments as Associate Professor at the Department of Microbiology and Immunology, Yong Loo Lin School of Medicine, National University of Singapore (NUS), Principal Investigator at the Singapore Immunology Network (SIgN), A\*STAR, as well as Associate Professor in the Department of Infection Biology in the London School of Hygiene and Tropical Medicine (LSHTM), U.K. In 2020, he moved to the newly founded A\*STAR Infectious Diseases Labs (A\*STAR ID Labs).



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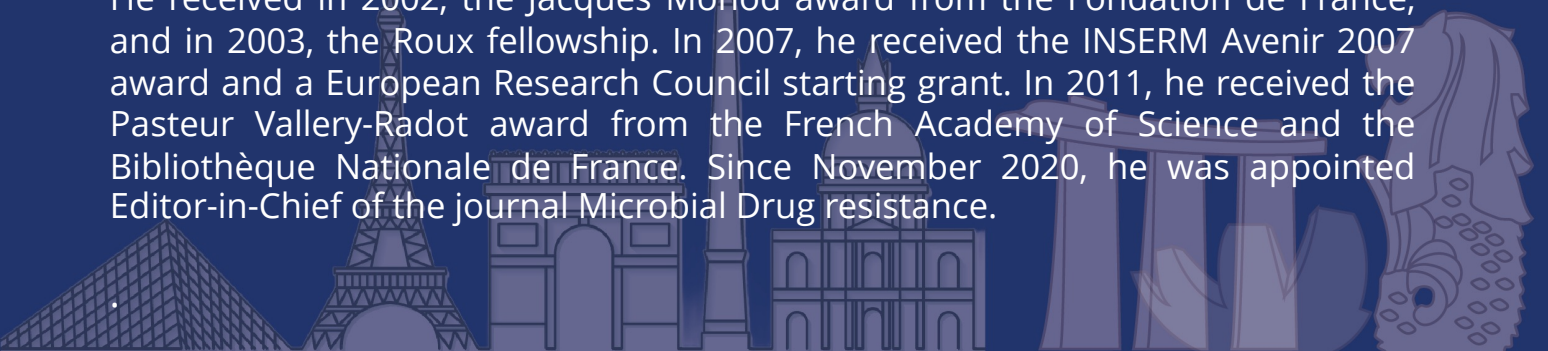


**Dr Ivo BONECA**  
**Head of the Biology and Genetics of Bacterial  
Cell Wall Laboratory, Institut Pasteur**

**Talk Title: Developing both targeted and unbiased approaches to develop  
new antibiotics**

### **Biosketch:**

Ivo Boneca worked for his Thesis under the supervision of Prof. Alexander Tomasz, at The Rockefeller University, New York, USA, and finished his Ph.D in Biology in 2000. He obtained his Ph.D from the Institut of Technical Chemistry and Biology (ITQB) from the New University of Lisbon (UNL), Portugal. From 2000 to 2004, he was a post-doctoral fellow at the Institut Pasteur. In 2004, he became an INSERM investigator at the Institut Pasteur. In 2008, Ivo was awarded a junior group and then in 2013 a unit at the Department of Microbiology, Institut Pasteur, Paris, France. In 2010, Ivo defended his HDR at the Université Paris Descartes. In 2015, he became INSERM Research Director. He was deputy Director of Department in 2017-2019. Since January 2022, he also directs the INSERM Unit U1306 Host-microbe interaction and pathophysiology. He received in 2002, the Jacques Monod award from the Fondation de France, and in 2003, the Roux fellowship. In 2007, he received the INSERM Avenir 2007 award and a European Research Council starting grant. In 2011, he received the Pasteur Vallery-Radot award from the French Academy of Science and the Bibliothèque Nationale de France. Since November 2020, he was appointed Editor-in-Chief of the journal Microbial Drug resistance.







# A\*STAR ID LABS- PASTEUR JOINT SYMPOSIUM

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## Speakers – Session 3 Antimicrobial Resistance



**Dr Teck Hui TEO**  
**Principal Investigator, A\*STAR ID Labs**

### **Talk Title: Investigating mucosal pathogenesis of AMR gram-negative bacteria**

#### **Biosketch:**

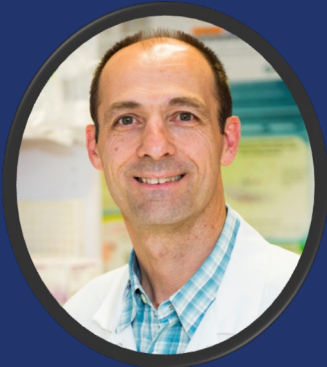
Teck-Hui obtained his PhD in 2015 from the National University of Singapore under the tutorage of Prof Lisa Ng and Prof Laurent Renia in Singapore Immunology Network (SIgN). During his PhD, he established the Chikungunya joint-inflammation mouse model that were extensively used for deciphering immune pathogenesis during single and Chikungunya-Malaria co-infection. Subsequently, he joined SIgN and was part of the ZIKA virus outbreak task force, where he established a mouse embryos infection model to test therapeutics against ZIKA infection. In 2018, Teck-Hui was awarded the A\*STAR Graduate Scholarship – Post-Doctorate Fellowship where he spent 3 years under the supervision of Prof Philippe Sansonetti and Dr. Pamela Schnupf in Institute Pasteur, Paris and Institute Necker Enfant Malades. During this oversea fellowship, he gained the expertise to work with gut infection and microbiomes/pathobionts colonization models in germfree and conventional setting for mechanistic study of host-microbiome interaction in the gut. In 2021, he joined Assoc Prof Pablo Bifani's group in A\*STAR ID Labs and established different mucosal infection models of clinical *Klebsiella pneumoniae*. In late 2022, Teck-Hui was awarded NMRC-Young Investigator Research Grant to study the lung-gut-liver axis during *Klebsiella pneumoniae* infection and was appointed Investigator in 2023 to lead the Mucosal Infection Lab in A\*STAR ID Labs.



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## Speakers – Session 3 Antimicrobial Resistance



**Dr Laurent DEBARBIEUX**  
**Head of Bacteriophage, bacterium,  
host Laboratory, Institut Pasteur**

**Talk Title: Pulmonary Phage Therapy**

### **Biosketch:**

Laurent Debarbieux is a molecular microbiologist who holds a PhD from Lille University, France. He studied periplasmic glucan synthesis during his PhD and protein secretion and folding during his Post-doctorate at Harvard Medical School, both with the bacterial model organism *Escherichia coli*. After joining Institut Pasteur, he turned his attention to bacteriophages and their use to treat bacterial infections caused by antibiotic resistant bacteria. Using murine models his team currently investigates the potential and limits of phage therapy. His team also investigates the role of bacteriophages in the intestinal microbiota. L. Debarbieux is a Trustee of the International Society for Viruses of Microorganisms and President of the non-for profit association P.H.A.G.E. (Phage for Human Application Group Europe).





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### **Dr Laurent DEBARBIEUX**

**Abstract:** The killing efficacy of bacteria by bacteriophages is supported by more than a century of in vitro experiments. Much less abundant is the literature on in vivo models and scarce are the clinical trials supporting phage therapy. We are deciphering the parameters governing the efficacy of bacteriophage for treating acute pneumonia. Starting from the choice of the bacteriophage, moving toward the pharmacometric data and ending with the synergistic action of bacteriophage with the host immune system, I will present data supporting the step by step translation towards clinical application.







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## Speakers – Session 3 Antimicrobial Resistance



**Prof Yue WANG**  
**Senior Principal Investigator, A\*STAR ID Labs**

### **Talk Title: Mechanisms of virulence and antifungal resistance in Candida**

#### **Biosketch:**

Professor Yue Wang obtained his Ph.D. from the Department of Genetics, Cell and Developmental Biology, the University of Minnesota, in 1988. He joined IMCB as a Postdoctoral Research Fellow in 1989 and was promoted to Principal Investigator in 1993 and Research Director in 2009. He joined A\*STAR ID Labs as a Senior Principal Investigator on 1 April 2022.

Professor Wang's exceptional research accomplishments led to him receiving the prestigious President's Science Award in 2012. In recognition of his significant scientific contributions and original work that has advanced the field of microbiology, he was honoured as a fellow of the American Academy of Microbiology in 2023. His expertise and standing in the field are evident from his service on the editorial boards of reputable journals such as *Virulence*, *eLife*, and *Fungal Genetics and Biology*.





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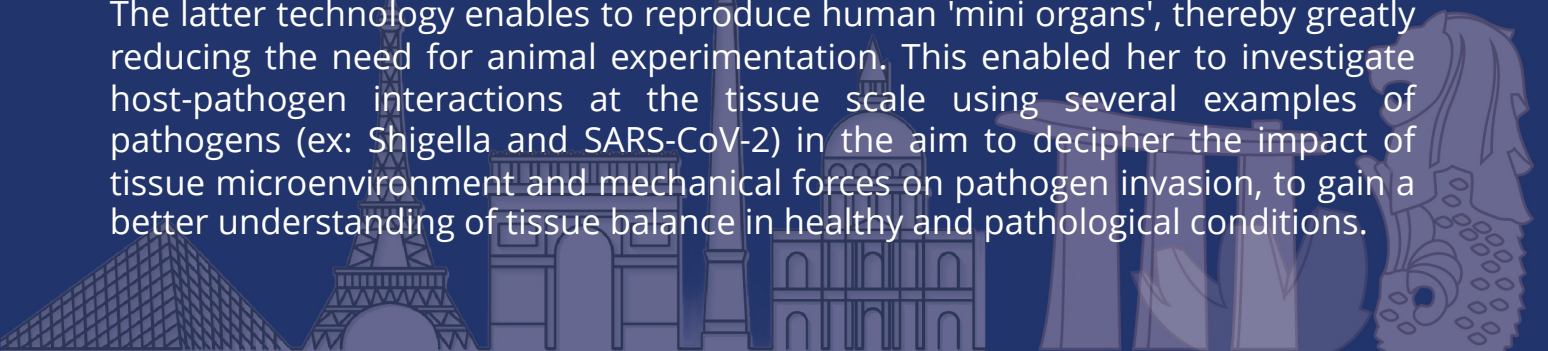


**Dr Nathalie SAUVONNET**  
**Group Leader of Group Tissue Homeostasis,**  
**Institut Pasteur**

**Talk Title: Impact of tissue microenvironment and mechanical forces of the gut on pathogens invasion**

### **Biosketch:**

Nathalie Sauvonnet is a research director at the Institut Pasteur. She did her PhD in microbiology in Pasteur on the secretion of Klebsiella bacteria, followed by a postdoctoral fellowship on Yersinia bacteria, the agent of plague. Returning to the Institut Pasteur Paris at the end of 2002, she obtained a permanent research position working in cell biology in eukaryotes, especially in human immune cells. In 2009, she was awarded her habilitation to direct research, and since then she has been working in two parallel areas: (i) the intracellular trafficking of key immune receptors and (ii) the close relationships between pathogenic microorganisms and target human cells. Nathalie's team developed and used several techniques like RNAi screen, CrispR-Cas9 gene edition, live TIRF microscopy, robust image analysis, single particle tracking, and more recently organ-on-chip. The latter technology enables to reproduce human 'mini organs', thereby greatly reducing the need for animal experimentation. This enabled her to investigate host-pathogen interactions at the tissue scale using several examples of pathogens (ex: Shigella and SARS-CoV-2) in the aim to decipher the impact of tissue microenvironment and mechanical forces on pathogen invasion, to gain a better understanding of tissue balance in healthy and pathological conditions.





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## Speakers – Session 3 Antimicrobial Resistance

### **Dr Nathalie SAUVONNET**

**Abstract:** Mechanical forces are essential to biological functions, but their influence on infectious processes is not yet understood. The human colon, organized in three dimensions (3D), is constantly subjected to forces induced by fluid flow and peristaltic movement. We have shown, using organ-on-a-chip (OOC), that the 3D architecture of the intestine and its mechanical stimulation enable highly efficient invasion of the human-restricted *Shigella* pathogen, as found in patients. More precisely, we observed that this microenvironment significantly improved the colonization rate, virulence and cell-to-cell spread across the colonic barrier. More recently, we have developed a colon-on-a-chip model combining human colon organoids with OOC to determine the impact of mechanical stimulation and microbiota metabolites on the colonic organization. We observed that OOC, compared to static 2D maturation, modifies gene expression by increasing cell specialization while maintaining the stem cell population, leading to a 3D barrier that closely mimics the human colon. Finally, by modulating mechanical forces and microbiota metabolites incubation, we analysed SARS-CoV-2 infection and found that these parameters have a significant impact on viral invasion, replication, and inflammation in this colon-on-chip model. Our results highlight the importance of recapitulating the tissue microenvironment and mechanics to study homeostasis, infection, and inflammation.







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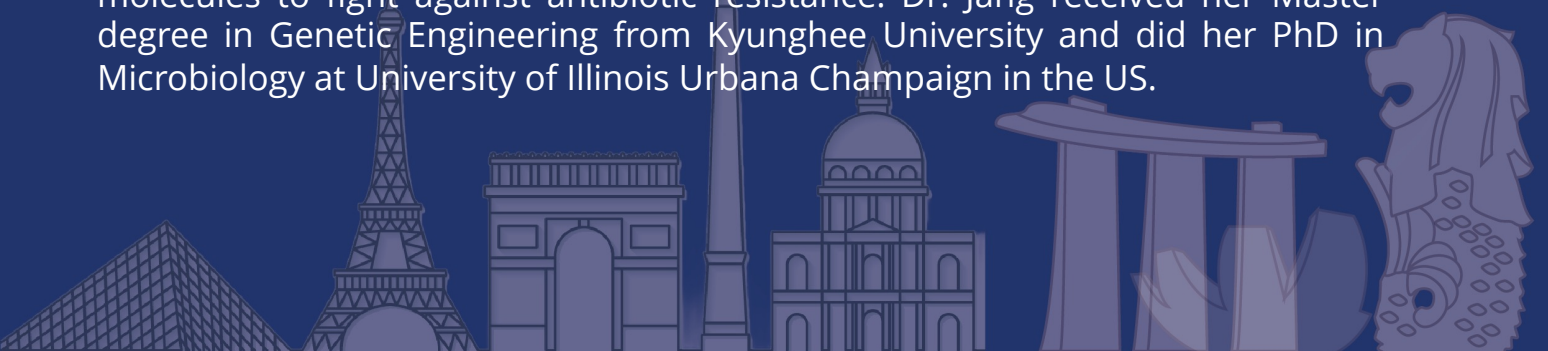


**Dr Soojin JANG**  
**Head of Antibacterial Resistance Laboratory,**  
**Discovery Biology, Institut Pasteur Korea**

### **Talk Title: A battle against antibiotic resistance: From basic science to applications**

#### **Biosketch:**

Soojin Jang is the Head of Antibacterial Resistance Laboratory at Institut Pasteur Korea. Dr. Jang has over 10 years of research experience in microbial genetics, biochemistry, and molecular biology of bacteria and parasites. At Institut Pasteur Korea, Dr. Jang established Antibacterial Resistance Laboratory and has successfully leveraged her expertise in bacterial physiology to design and implement high-throughput small molecule screenings for the discovery of novel antibacterial agents. Dr. Jang is working with various domestic and international partners including Global Antibiotic Research & Development Partnership (GARDP), an initiative between WHO and DNDi for development of new antibiotics, contributing her expertise on discovery of new antibacterial molecules to fight against antibiotic resistance. Dr. Jang received her Master degree in Genetic Engineering from Kyunghee University and did her PhD in Microbiology at University of Illinois Urbana Champaign in the US.







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## Speakers – Session 3 Antimicrobial Resistance

### **Dr Soojin JANG**

**Abstract:** Antibiotic resistance (AR) is a silent pandemic that kills millions around world. Almost 5 million people died associated with antibiotic resistance in 2019, including 1.27 million deaths directly caused by antibiotic resistant bacterial infections. Among these deaths, over 50% were attributable to drug resistant Gram negative bacteria such as *Escherichia coli*, *Klebsiella pneumoniae*, *Acinetobacter baumannii* and *Pseudomonas aeruginosa*, which were listed by the World Health Organization as priority pathogens for urgent development of novel therapies to save millions of lives. The presentation introduces current research activities in Institute Pasteur Korea to gain insights and find better solutions for a battle against antibiotic resistance of Gram negative bacteria applying advanced technologies and collaborating with international partners





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