



Research evaluation

FINAL RESUME ON THE RESEARCH UNIT  
Department of Microbiology

UNDER THE SUPERVISION OF THE  
FOLLOWING INSTITUTIONS AND RESEARCH  
BODIES:

Institut Pasteur Paris

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**EVALUATION CAMPAIGN 2020-2021**  
GROUP B

Report published on May, 03 2021

High Council for evaluation of research and higher education



In the name of Hcéres<sup>1</sup>:

Mr Thierry Coulhon, President

In the name of the experts committee<sup>2</sup>:

Mr Alain Filloux, Chairman of the committee

Under the decree No.2014-1365 dated 14 November 2014,

<sup>1</sup> The president of Hcéres "countersigns the evaluation reports set up by the experts committees and signed by their chairman." (Article 8, paragraph 5);

<sup>2</sup> The evaluation reports "are signed by the chairman of the experts committee". (Article 11, paragraph 2).

Tables in this document were filled with certified data submitted by the supervising body on behalf of the unit.

## UNIT PRESENTATION

**Unit name:**

Department of Microbiology

**Application type:**

Renewal

**Head of the unit (2020-2021):**

Mr Frédéric Barras

**Project leader (2021-2025):**

Mr Frédéric Barras

**Number of teams:**

17

## EXPERTS COMMITTEE MEMBERS

**Chair:**

Mr Alain Filloux, Imperial College London, UK

**Experts:**

Ms Chantal Abergel, CNRS, Marseille

Ms Nathalie Campo, CNRS, Toulouse (representative of CoNRS)

Mr Stéphane Fontanay, Université Claude Bernard Lyon 1, Villeurbanne (supporting personnel)

Mr Mohamed-Ali Hakimi, Université Grenoble Alpes, Grenoble (representative of INSERM)

Mr Richard Hayward, University of Cambridge, UK

Mr Joseph Schacherer, Université de Strasbourg (representative of CNU)

Ms Kirsten Jung, Ludwig-Maximilians-Universität München, Germany

Mr Iñigo Lasa, Universidad Publica de Navarra, Spain

Mr Peter Sebo, Institute of Microbiology of the Czech Academy of Sciences, Czech Republic

Mr Luiz Pedro Sorio De Carvalho, The Francis Crick Institute, UK

Mr Patrick Viollier, Université de Genève, Suisse

Mr Willem Van Schaik University of Birmingham, UK

## HCÉRES REPRESENTATIVE

Ms Birke Bartosch

## REPRESENTATIVES OF SUPERVISING INSTITUTIONS AND BODIES

Mr Christophe D'Enfert, Institut Pasteur

Ms Evelyne Jouvin-Marche, Inserm

Mr Eduard Kaminski, Université de Paris

Mr Didier Mazel, Institut Pasteur

Mr Christian Muchardt, CNRS

Mr Mariano Ostuni, Université de Paris

## INTRODUCTION

### HISTORY AND GEOGRAPHICAL LOCATION OF THE UNIT

The Department of Microbiology was created in 2006 and is spread across eight buildings. It has a fifteen year-long history, and the direction rotates. The director and deputy director from the previous mandate (2014-2019) were Ms H. de Reuse and Mr JM. Ghigo, respectively. At the start of the previous mandate, the Department comprised fifteen entities, and this has now moved up to seventeen entities. This is the result of retirements, new arrivals, confirmation or discontinuation of teams. To be highlighted are the arrivals from outside Institut Pasteur of Mr E. Lemichez and Mr F. Barras, and from across Department, Mr J. Pizarro-Cerda, Mr R. Brosch and Ms C. Buchrieser. As for departure, Mr M. Popoff and Mr P. Forterre retired and the junior group of Mr S. van Teeffelen will close due to the PI moving to Montréal.

### RESEARCH ECOSYSTEM

The evolution of the Department of Microbiology has clearly involved movement from other Departments of Institut Pasteur and in both directions. This dynamic reflects a better integration of the existing teams/research units within Institut Pasteur, strengthening the visibility in specific areas of fundamental microbiology research. Yet there are a large number of cross department interactions and in some instances, the teams from other departments have a secondary affiliation to the Department of Microbiology (e.g. D. Mazel, E. Rocha, D. Ladant, G. Dumenil, P. Alzari, etc.).

The flux in recruitment of individuals affiliated to the CNRS has resulted in the creation of the UMR 2001 in January 2019, to which eight teams are currently affiliated. The university associated with the UMR is Université de Paris. The contour of this UMR is meant to evolve in the future mandate, notably with teams within the Department, which are currently associated with other UMRs, to be moved to the UMR 2001. In parallel, the creation of an ERL-INSERM, including the teams of Mr I. Boneca-Gompert and Mr E. Lemichez, has been proposed. Institut Pasteur, CNRS, INSERM and Université de Paris will be the supervising institutions for the Department, whereas some specific teams have additional affiliations, e.g. Assistance Publique-Hôpitaux de Paris associated with Mr P. Glaser's research unit.

Most teams in the Department are currently part of the LABEX IBEID (Integrative Biology of Emerging Infectious Diseases) initially led by Ms P. Cossart and Mr P. Sansonetti and now headed by Mr P. Bastin, Ms C. Saleh and Mr M. Vignuzzi. The LABEX has been instrumental in the installation of units coming from outside Pasteur, notably the ones of Mr F. Barras and Mr E. Lemichez.

Some (4) of the Department entities host National Reference Centres (NRC). The Cyanobacteria collection, headed by Ms M. Gugger, represents an entity on its own. Meanwhile, three collections (led by Ms D. Clermont, Ms M. Pina and Ms R. Hurtado-Ortiz) are no longer part of the Department and have been moved to the Centre de Ressources Biologiques de l'Institut Pasteur (CRBIP) headed by Mr S Brisse.

Finally, the teams within the Department are formally well engaged internationally with the Institut Pasteur network in Montevideo (Uruguay) for the team of Mr M. Picardeau on zoonotic diseases, and in Madagascar for the Team of Mr J. Pizarro-Cerda on Yersinia and plague.

### HCÉRES NOMENCLATURE AND THEMATICS OF THE UNIT

SVE3\_1 Microbiology

### MANAGEMENT TEAM

The Department head is Mr Frédéric Barras, the Department deputy head is Mr Bruno Dupuy.

## UNIT WORKFORCE

Name of the unit: Department of Microbiology

Active staff	Number 06/01/2020	Number 01/01/2022
Full professors and similar positions	4	5
Assistant professors and similar positions	2	2
Full time research directors (Directeurs de recherche) and similar positions	19	18
Full time research associates (Chargés de recherche) and similar positions	22	21
Other scientists ("Conservateurs, cadres scientifiques des EPIC, fondations, industries, etc.")	2	1
High school teachers	0	0
Supporting personnel (ITAs, BIATSSs and others, notably of EPICs)	50	50
<b>Permanent staff</b>	<b>99</b>	<b>97</b>
Non-permanent professors and associate professors, including emeritus	0	
Non-permanent full time scientists, including emeritus, post-docs (except PhD students)	33	
PhD Students	39	
Non-permanent supporting personnel	6	
<b>Non-permanent staff</b>	<b>78</b>	
<b>Total</b>	<b>177</b>	<b>97</b>

## GLOBAL ASSESSMENT OF THE UNIT

The Department of Microbiology is an impressive entity grouping seventeen teams with a unique focus and breadth of research that covers basic and fundamental understanding on the physiology, evolution and adaptation of bacteria, bacteriophages, cyanobacteria, archaea and their viruses. The breadth in themes is combined with a breadth in multidisciplinary approaches expanding from basic molecular microbiology towards sophisticated microscopy and embracing biochemistry, structural biology, cellular biology and multi-omics.

The Department has delivered cutting-edge and ground-breaking science, essentially based on curiosity-driven questions. Yet the science underpins extremely important medical and societal issues since most teams work on bacterial pathogens, such as *Mycobacterium tuberculosis*, *Legionella pneumophila*, *Helicobacter pylori*, *Clostridoides*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, pathogenic *Escherichia coli*, *Neisseria meningitidis*, *Leptospira* species, *Yersinia* species or *Streptococcus* species. This provides unique opportunities in translational research and alternative therapeutic strategies including development and improvement of vaccines (e.g. *Mycobacterium* or *Yersinia*), screen for new antimicrobial drugs (e.g. *Clostridoides* and *Mycobacterium*) or phage therapy. It is important to underline that it is the fundamental science, which underpins the translational research and not the other way round. Major discoveries are made on non-pathogenic organisms, such as *E. coli*, archaea and Cyanobacteria, while characterization of novel and fascinating organisms, such as the diderm firmicutes continue to fill gaps in our understanding of the evolution of microorganisms.

The research in the Department is conducted by scientists of international stature. Notably, all heads of teams represent a reference in their respective field and almost half of them would meet the requirements for being candidates to major awards, such as ERC grants. The scientific output is steady and strong with more than 800

peer-reviewed publications and no less than twenty patents submitted or filed over the past five years. The teams of the Department are highly successful in attracting external funding, in particular participating or coordinating ANR grants, with the volume of external funding having increased from 3 to almost 6 M€ over the evaluated period. In the five-year project, there are no specific weaknesses to flag but definitely ambitious projects, sometimes perhaps too ambitious, but driven by passionate and talented scientists. The Department keeps a strong focus on the evolution and adaptation of microorganisms, including adaptation to environmental stress, survival in the host and resistance to antimicrobials. Yet, the new project highlights one specific/unifying theme, the microbiota, which is flagged in most teams and will generate cross collaboration and shared expertise, notably when considering the gut and anaerobic organisms.

The scientific dynamic of the Department is coupled with its structural evolution. The succession of previous unit heads has been a great success. Three new teams were created by members of the closed former archaeal biology unit, with the three new heads having a specific and unique niche (archaea, phages and cell wall). The revitalization of units, such as the *Yersinia* and Toxins units, by the arrival of new heads either from another department of Institut Pasteur, or from outside, was a real success. Cross-department connectivity has also contributed to the transfer of existing teams, bringing further cell biology and omics expertises into the Department of Microbiology. The consolidation of one junior group (G5 group) into a team further contributed to the Department healthy balance between young and more experienced scientists. Finally, the reputation of the Department is also reflected in the creation of new teams by attracting external researchers, notably the team working on oxidative stress, whose head has taken the lead of the Department and successfully developed this new plan.

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