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DynAMic - Dynamique des génomes et adaptation microbienne

Rapport Hcéres

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HCERES

High Council for the Evaluation of Research
and Higher Education

Department of Research Evaluation

report on research unit:

Dynamics of Genome and Microbial Adaptation

DynAMic

under the supervision of
the following institutions
and research bodies:

Université de Lorraine

Institut National de la Recherche Agronomique - INRA

Evaluation Campaign 2016-2017 (Group C)

HCERES

High Council for the Evaluation of Research
and Higher Education

Department of Research Evaluation

In the name of HCERES,¹

Michel Cosnard, president

In the name of the experts committee,²

Pascal Simonet, chairman of the committee

Under the decree N°2014-1365 dated 14 november 2014,

¹ The president of HCERES "countersigns the evaluation reports set up by the experts committees and signed by their chairman." (Article 8, paragraph 5)

² The evaluation reports "are signed by the chairman of the expert committee". (Article 11, paragraph 2)

Evaluation report

This report is the sole result of evaluation by the expert committee, the composition of which is specified below.

The assessments contained herein are the expression of an independent and collegial reviewing by the committee.

Unit name: Dynamics of Genome and Microbial Adaptation

Unit acronym: DynAMic

Label requested: UMR INRA, UL

Current number: UMR INRA-UL 1128

Name of Director (2013-2017): Mr Pierre LEBLOND

Name of Project Leader (2018-2022): Mr Bertrand AIGLE

Expert committee members

Chair: Mr Pascal SIMONET, École centrale de Lyon

Experts: Ms Christine CITTI, INRA, Toulouse (representative of the CSS INRA)

Mr Philippe JACQUES, TERRA Research Center, Gembloux Agro-Bio Tech, University of Liège, Belgium

Mr Dominique SCHNEIDER, TIMC-IMAG, Grenoble

Mr Niclas SETTERBLAD, Plateforme IUH, Paris (representative of supporting personnel)

Scientific delegate representing the HCERES:

Ms Anne CAIGNARD

Representatives of supervising institutions and bodies:

Mr Andreas GUTSFELD, U Lorraine

Mr Alain HEHN, U Lorraine

Mr Jean-Pierre JACQUOT, U Lorraine

Mr Francis MARTIN, INRA

Mr Christophe N'GUYEN-THÉ, INRA

Head of Doctoral School:

Mr Stéphane DESOBRY, Doctoral School n° 410 « Ressources Procédés Produits environnement »

1 • Introduction

History and geographical location of the unit

The Joint Research Unit (UMR 1128) was created in 2001. The initial name of this UMR was “Genetics and Microbiology” associating the Microbiology department (now MICA “Microbiologie et Chaîne Alimentaire” for “microbiology and food chain”) of the French National Institute for Agricultural Research (INRA), and the Université Lorraine (UL). The UMR 1128, “Genetics and Microbiology” was founded and headed by Mr Bernard DECARIS until 2007, and then, by Mr Pierre LEBLOND who is the director since 2 term periods. UMR 1128 became “Dynamique des génomes & adaptation microbienne” and in 2012, the creation of the UL from the merging of the four local universities led the unit to create a joint mixt unit between INRA (MICA) and UL. In 2015, Mr Bertrand AIGLE became deputy director in charge of preparing the next contract and the candidate to become the director, and Ms Sophie PAYOT-LACROIX is proposed as the deputy director.

The lab is located on the campus of the Faculty of Sciences and Technologies, University of Lorraine at Vandoeuvre-lès-Nancy.

Management team

The current director (2011-2017) is Mr Pierre LEBLOND who is completing his second contract as the unit director. Since 2015, Mr Bertrand AIGLE is deputy director of the unit. For the next contract, Mr Bertrand AIGLE will head the unit and Ms Sophie PAYOT-LACROIX will be the deputy head of the unit. The unit is organized in 2 teams, Team1: ICE Transfer and Adaptation ICE-TeA (Head: Ms Nathalie LEBLOND-BOURGET who replaced Ms Sophie PAYOT-LACROIX in October 2015) and Team 2: Streptomyces Adaptation (StrAda) (Head: Mr Pierre LEBLOND).

The unit established a collegial executive direction in 2015 to discuss strategic options about the future of the lab (scientific topics, integration into the local scientific landscape...) and to manage the lab (e.g., financial management).

HCERES nomenclature

Main domains: SVE2

Secondary domains: SVE1

Scientific domains

UMR 1128 was historically involved in studying the plasticity of Gram-positive bacterial genomes. Their work is focused on two bacterial genus models, Streptococcus, that colonizes the digestive tracts of animals, and Streptomyces species native from soil. They use the whole range of molecular microbiology (including high-throughput sequencing) and genome evolution (including bioinformatics) tools to investigate the mechanisms of genome plasticity, including horizontal gene transfers mediated by mobile genetic elements and recombination. They also study the consequences of these events on contingency genes such as virulence and resistance genes as well as on secondary metabolite gene clusters.

Unit workforce

Unit workforce	Number on 30/06/2016	Number on 01/01/2018
N1: Permanent professors and similar positions	3	
N2: Permanent researchers from Institutions and similar positions	8	
N3: Other permanent staff (technicians and administrative personnel)	6	
N4: Other researchers (Postdoctoral students, visitors, etc.)	1	
N5: Emeritus		
N6: Other contractual staff (technicians and administrative personnel)	3	
N7: PhD students	5	
TOTAL N1 to N7	26	
Qualified research supervisors (HDR) or similar positions	5	

Unit record	From 01/01/2011 to 30/06/2016
PhD theses defended	8
Postdoctoral scientists having spent at least 12 months in the unit	2
Number of Research Supervisor Qualifications (HDR) obtained during the period	

2 • Assessment of the unit

Global assessment of the unit

Historically, this unit is involved in the study of genome plasticity with a particular focus on horizontal gene transfers using and developing molecular microbiology and genome evolution tools. Whatever the microbial models investigated (*Streptococcus* and *Streptomyces*), the unit has developed a strong expertise on mobile genetic elements and genome recombination. Their objectives are also to study the consequences of these phenomena (contingency genes such as virulence and resistance genes as well as secondary gene clusters). Two bacterial models are investigated including a colonizer of the digestive tracts of animals, *Streptococcus*, and a soil bacterium *Streptomyces*.

Although the scientific objectives of the unit concern an area that falls clearly within fundamental research, they also match with the more applied priorities of the INRA department MICA including the CT2 (biodiversity and evolution of pathogenicity) and the CT3 (characterization and functional analysis of ecosystems) thematic fields. The unit themes and particularly those developed in team 1 are also integrated in main challenges of INRA 2010-2020, notably the development of safe and sustainable food systems.

In response to concerns raised in the previous evaluation report (2012), the unit was able to secure funding with several significant projects awarded, including 3 ANR projects (2 as coordinators), 4 Labex projects (namely, Comicoft, Inabact, Ewoc, Sexso) (as coordinator) as well as supports from local sources (Région Lorraine). The recent submission of 3 international projects (1 H2020 and 2 JPI-AMR) confirms the dynamics of the unit toward a more active politics to secure the funding of their research.

Teaching is consuming a large part of the time of the unit staff (including engineers and technicians) with the supervision of no less than 35 UEs (Teaching units) from L1 to M2 levels, the management of the BioMANE master “Biotechnology, Microbiology, Aliment, Nutrition, Environnement”, and of the Département BVGM (Biologie Végétale, Microbiologie, Génétique). Moreover, the unit implemented in 2012 a new course, CMI (“Cursus Master en Ingénierie”), giving a strong scientific background as well as in humanities and social sciences to graduate students to favour their insertion into the professional world.

A major strength of this unit is the coherence of its scientific program.

The unit has succeeded in completing its historical research on mechanisms by developing ecological studies. This is extremely important as environmental stimuli impact strongly on variability and adaptation of bacterial strains. This thematic strengthens the links with other local partners including partners from INRA.

Other strengths are the youth of the team, the appeal for PhD students for recruiting new scientists (a full assistant professor), the recruitment of 2 full time technicians, the motivation of the staff and an excellent collaborative atmosphere and friendly relationships among all the staff.

This unit provides a concrete example of a valuable association between INRA University and is very well integrated in the Région Lorraine research and academic community. Its network of national and international collaborations offers, to the scientists of each team, access to cutting-edge technologies and/or knowledge.

Finally, the global activity is well balanced between acquisition of knowledge, research management, academic teaching and research training.

The research performed by the unit is overall excellent. Quantity and quality of the scientific production are very good. In addition, several actions are undertaken to exploit the results of the fundamental research, including patenting of molecules and interactions to develop partnerships with industrials in the pharmaceutical and wood sectors.