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Département de biologie structurale et chimie

Rapport Hcéres

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HCERES

High Council for the Evaluation of Research
and Higher Education

Research units

HCERES report on research unit:

Department of Structural Biology and Chemistry

DBSC

Under the supervision of the following
institutions and research bodies:

Institut Pasteur

Centre National de la Recherche Scientifique - CNRS

HCERES

High Council for the Evaluation of Research
and Higher Education

Research units

In the name of HCERES,¹

Michel COSNARD, president

In the name of the experts committee,²

Yvonne JONES, chairwoman of the committee

Under the decree N^o.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: Department of Structural Biology and Chemistry

Unit acronym: DBSC

Label requested:

Current number:

**Name of Director
(2015-2016):** Mr Michael NILGES

**Name of Project Leader
(2017-2021):** Mr Michael NILGES

Expert committee members

Chair: Ms Yvonne JONES, STRUBI, Oxford, UK

Experts: Mr Loïc BLUM, Université Lyon 1 (representative of the CNU)

Ms Agnès DELMAS, CNRS, Orléans

Mr Patrice GOUET, Institut de Biologie et Chimie des Protéines (representative of the CoNRS)

Mr Christian GRIESINGER, Max Planck Institute, Gottingen, Germany

Ms Angela GRONENBORN, University of Pittsburgh, USA

Mr Richard LAVERY, CNRS, Lyon

Mr Chris MEIER, University of Hamburg, Germany

Mr Christoph MUELLER, EMBL, Heidelberg, Germany

Ms Virginie NAHOUM, IPBS, CNRS, Toulouse

Mr Emanuele PACI, University of Leeds, UK

Mr Roman ZUBAREV, Karolinska Institute, Stockholm, Sweden

Scientific delegate representing the HCERES:

Mr Georges MASSIOT

Representatives of supervising institutions and bodies:

Mr Alain ISRAEL, Institut Pasteur

Mr Hughes LORTAT-JACOB, CNRS

Mr Jacques MADDALUNO, CNRS

Mr Frédéric SCHMITT, CNRS

1 • Introduction

History and geographical location of the unit

The “Department of Structural Biology and Chemistry” (DBSC) was formed within the Institut Pasteur in 2001. The DBSC currently consists of ten scientific teams and four research platforms. Eight of the teams specialise in various aspects of structural biology and two in chemistry. This concentration of structural biology teams makes DBSC one of the major centres for structural biology in France. The structural biology teams and the platforms belong to CNRS UMR 3528 (Biologie Structurale Intégrée des Processus Cellulaires et Agents Infectieux), a research unit shared between the CNRS and the Institut Pasteur. Likewise, the two chemistry teams belong to CNRS UMR 3523 (Chimie Organique). The DBSC is entirely located on the Pasteur Campus, however, the teams of the unit are somewhat dispersed, occupying different buildings on both sides of the rue du Docteur Roux.

Management team

The DBSC, like all Pasteur Departments, has a director and a deputy director. By general accord Mr Michael NILGES continues to serve as director (he has been re-appointed by the team heads for four consecutive yearly terms since 2006) and Ms Laurence MULARD serves as deputy director (appointed 2014).

HCERES nomenclature

SVE1_LS1 Biologie moléculaire et structurale, biochimie

ST4 Chimie

Scientific domains

Structural biology, chemistry

Unit workforce

Unit workforce	Number on 30/06/2015	Number on 01/01/2017
N1: Permanent professors and similar positions	2	2
N2: Permanent researchers from Institutions and similar positions	37 [36.8]	36 [35.8]
N3: Other permanent staff (technicians and administrative personnel)	58 [51.35]	54 [47.25]
N4: Other professors (Emeritus Professor, on-contract Professor, etc.)		
N5: Other researchers from Institutions (Emeritus Research Director, Postdoctoral students, visitors, etc.)	34	
N6: Other contractual staff (technicians and administrative personnel)	2	
N7: PhD students	18	
TOTAL N1 to N7	151 [143.15]	
Qualified research supervisors (HDR) or similar positions	25	

Unit record	From 01/01/2010 to 30/06/2015
PhD theses defended	26
Postdoctoral scientists having spent at least 12 months in the unit	45
Number of Research Supervisor Qualifications (HDR) obtained during the period	6

2 • Overall assessment of the unit

Introduction

The scientific interests of the DBSC are united by the overarching theme of integrated structural cellular biology. The biological systems targeted using this integrated approach are varied but in general play roles in human pathology. Thus, a characteristic aim of the research teams is investigation of the atomic and/or molecular level mechanisms of action of biological systems and application of the insights gained to development of novel therapeutic interventions. This ambitious strategy requires a multidisciplinary approach that combines state-of-the-art expertise in methods spanning biology, chemistry, and physics. Integrated structural cellular biology is a rapidly developing field, it is therefore vital that the DBSC regularly scans the horizon to identify, and fill, any gaps in expertise and instrumentation that may undermine their ability to deliver forefront research. The DBSC, and the Institut Pasteur, have shown themselves to be alert to this challenge. Recruitments at the junior team leader level have targeted research areas that are appropriate fits to the department strategy. Also, since the last evaluation report, a senior team leader of international standing in proteomics and structural mass spectrometry has been recruited. This appointment brought expertise and equipment to complement an existing portfolio of technologies that includes x-ray crystallography, NMR, electron cryo microscopy (cryoEM) biophysical and biochemical characterisation, and numerical simulation. Notably, the DBSC and Institut Pasteur have reacted decisively to what are recognised worldwide as

ground breaking developments in cryoEM technology. An outstandingly successful fund raising campaign has enabled the purchase of the latest state-of-the-art equipment for cryoEM.

Global assessment of the unit

The DBSC has maintained its position in the front rank of structural biology internationally in terms of the overall quality, quantity and impact of the scientific research conducted over the review period. The overarching theme of integrated structural cellular biology positions the department at the leading edge of research into molecular mechanism. The recruitment strategy and the choices made have been very successful. The team leaders (junior and senior) recruited over the last review period are all excellent and very appropriate scientific fits to the DBSC strategy and indeed the Institut Pasteur research community overall. The purchase of a Titan Krios is absolutely the right move to advance the cryoEM facilities at the Institut Pasteur to the top level and opens up major opportunities for research teams throughout the Institute. Consequently, the support, access and training strategies for cryoEM must be very carefully thought through and implemented. Indeed, the effective engagement of technology platforms with the research drivers of their users is essential and great care must be taken to maintain this; one major strength of the DBSC is the implementation and updates of platforms that are necessary to advance premier research. The inclusion of chemistry within the DBSC is excellent and appropriate. Access to in-house advice on chemistry is invaluable and needed for the whole Institute. However, the challenge is how best to nurture and grow chemistry, this will require careful consideration and broad consultation.

Strengths and opportunities in the context

- strong support from the Institut Pasteur and the CNRS;
- outstanding department leadership to provide strategic vision and effective organisation;
- a critical mass of internationally competitive research teams with complementary interests and expertise;
- well-developed research collaborations within the Pasteur as well as worldwide (including with Institutes in the Pasteur International Network);
- scientifically excellent team leader recruitments that are very appropriate strategic fits;
- platforms that are technically outstanding and appropriate to support internationally forefront research;
- major investment in state-of-the-art instrumentation (e.g. cryoEM, mass spectrometry).

Weaknesses and threats in the context

- one challenge that inevitably results from success is retention of outstanding staff;
- major investment in cryoEM instrumentation inevitably generates a series of challenges associated with increased computational and data storage requirements, as well as support, training and access;
- there is a danger that organisational structures may lead to the separation of key technologies provided by the platforms from the science drivers of the community they serve;
- suitable space for the future requirements of the research teams is a particular problem given the wide range of technologies used.

Recommendations

A general ability to react nimbly to strategic threats and opportunities is crucial to allow the department to maintain a position at the international forefront of research in integrated structural biology. This requires vigilance that effective routes of communication are maintained within the department and, importantly, the Institut Pasteur, for timely discussion and fully informed action on staff recruitment/retention and development/management of infrastructure.

A well thought through computational infrastructure as well as optimal support, access and training strategies will need to be developed and implemented to ensure that maximal benefit is derived from the major investment in

cryoEM instrumentation. A number of Centres are grappling with these same issues worldwide and it will be important to share experience and best practice.

Careful consultation and case-by-case analysis of the planned changes in the organisation of platforms should be undertaken to ensure that platforms continue to be strongly involved with, and driven by, the cutting edge research and needs of the teams they serve.

Given the dispersed nature of DBSC space within the Institut Pasteur campus, well-informed discussion and planning needs to be maintained at the Institute level for major initiatives. Wherever possible the organisational structure should employ flexible, pragmatic approaches to group size and space to promote forefront research and to capitalize on external funding opportunities, assuming that these accord with the strategic priorities of the DBSC.