

Research evaluation

FINAL RESUME ON THE RESEARCH UNIT Département de biologie computationnelle

UNDER THE SUPERVISION OF THE FOLLOWING INSTITUTIONS AND RESEARCH BODIES: Institut Pasteur Paris

EVALUATION CAMPAIGN 2020-2021 GROUP B

Report published on June, 27 2022



In the name of Hcéres¹:

Mr Thierry Coulhon, President

In the name of the experts committee²:

Mr Alfonso Valencia, Chairman of the committee

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

¹ The president of Hcéres "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 experts committee". (Article 11, paragraph 2).



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

UNIT PRESENTATION

Unit name: Département de biologie computationnelle Unit acronym: BCD Current label and N°: 021400 ID RNSR: 201522236J Application type: Renewal Head of the Unit (2020-2021): Mr Christophe Zimmer Project leader (2021-2025): Mr Christophe Zimmer Number of teams and/or themes: 7

EXPERTS COMMITTEE MEMBERS

Chair:	Mr Alfonso Valencia, Spanish National Cancer Research Centre, CNIO Espagne
Experts:	Ms Christine Durinx, Swiss Institute of Bioinformatics, SIB, Suisse
	Ms Celine Hernandez, Centre national de la recherche scientifique - CNRS
	Ms Janet Kelso Max Planck Society, Allemagne
	Mr Justin Kinney, Cold Spring Harbor Laboratory, États-Unis
	Ms Michal Linial, The Edmond and Lily Safra Center for Brain Sciences, Israel
	Mr Guido Sanguinetti, Physics and Chemistry of Biological Systems-SISSA, Italie
	Mr Alfonso Valencia, Spanish National Cancer Research Centre-CNIO, Espagne

HCÉRES REPRESENTATIVE

Mr Yacine Graba

REPRESENTATIVES OF SUPERVISING INSTITUTIONS AND BODIES

Mr Eric Fleury, INRIA Mr Didier Mazel, Pasteur Institute Mr Patrick Trieu-Cuot, Pasteur Institute



INTRODUCTION

HISTORY AND GEOGRAPHICAL LOCATION OF THE UNIT

The Computational Biology Department (CBD) of the Pasteur Institute was founded in 2019, building up from a pre-existing transversal structure, the Center for Bioinformatics, Biostatistics and Integrative Biology (C3BI), itself founded in 2015. The foundation of C3BI/CBD corresponded to a strategic action based on the recognition that the Pasteur Institute required an organized critical mass of computational expertise. The missions of the C3BI and then CBD are to support original methodological research in bioinformatics and provide bioinformatics support to Pasteur Institute research teams. As of June 2021, the department is organized around six research teams and one large support team, the Bioinformatics and Biostatistics Hub. The CBD is located on the Pasteur Institute campus, spread over three different buildings, most of them within the newly built Yersin building. The Pasteur Institute direction recently took the decision to move the Bioinformatics and Biostatistics Hub to a Tech centered department.

RESEARCH ECOSYSTEM

The CBD is one of the twelve scientific departments of the Pasteur Institute, which collectively define a critical mass of research teams covering many biological fields including microbiology, virology, immunology, genetics, cell and developmental biology, neurobiology and structural biology. The CBD is part of several local networking and scientific programs: the qBio quantitative biology program initiated by the Pasteur Institute; the Qlife Institute coordinated by the Curie Institute; the Inception program that fosters interdisciplinary research from biology to the social sciences; and the PRAIRIE institute, focused on artificial intelligence. The CBD is also well integrated in larger national IFB (French Institute of Bioinformatics), European (H2020 Elixir infrastructure) and international networks (IPIN, Pasteur Institute International Network).

HCÉRES NOMENCLATURE AND THEMATICS OF THE UNIT

SVE Sciences du vivant et environnement

SVE2 Biologie Cellulaire, Imagerie, Biologie Moléculaire, Biochimie, Génomique, Biologie Systémique, Développement, Biologie Structurale SVE3 Microbiologie, Immunité

MANAGEMENT TEAM

The department is headed by Mr. Christophe Zimmer, director, and by Mr. Gregory Batt, deputy director. The same management team is proposed for the next contract.

UNIT WORKFORCE

Active staff		Number 01/01/2022
Full professors and similar positions		
Assistant professors and similar positions		
Full time research directors (Directeurs de recherche) and similar positions		3
Full time research associates (Chargés de recherche) and similar positions		6
Other scientists ("Conservateurs, cadres scientifiques des EPIC, fondations, industries, etc.")		2
High school teachers		
Supporting personnel (ITAs, BIATSSs and others, notably of EPICs)	63	61
Permanent staff	75	72
Non-permanent professors and associate professors, including emeritus		



Non-permanent full time scientists, including emeritus, post-docs (except PhD students)		
PhD Students		
Non-permanent supporting personnel		
Non-permanent staff	34	
Total	109	72

GLOBAL ASSESSMENT OF THE UNIT

Computational Biology (CB) is a fundamental area of research for the future of biomedicine. The initial intention behind the creation of the CB department (CBD) was to build a critical mass in the area of Artificial Intelligence (AI) and Machine Learning (ML), as applied to biomedicine. This goal has been successfully accomplished by attracting talented young PIs, some of them now part of the Paris AI community (PR[AI]RIE), to build their groups at Pasteur. Unfortunately, the pandemic and the unexpected change in the CBD leadership have reduced the impact of the department on the research life of the Pasteur Institute, particularly in terms of interactions with affiliated groups and collaborations within the Institute more broadly.

The CBD is composed of teams led by three recently recruited early career group leaders (Teams 1, 3 and 4), two PIs previously at Pasteur (Teams 5 and 6) and a senior group (Team 2), who was recruited as Director of the Department from the Department of Cell Biology and Infection at the Institute Pasteur. The CBD has recently advertised two new group leader positions, and expects that these appointments will complement and connect the research interests and expertise of the existing groups in the near future. In addition to the research groups, the CBD hosts the Pasteur's Bioinformatics and Biostatistics Hub, which is a unique facility composed of almost 50 research engineers who provide research and technical support to the Institute's facilities and research groups. The CBD common interests in quantitative biology, as well as its substantial technical expertise in Machine Learning and other Computational Biology methods, are very good bases on which to build a coherent vision for the department, create synergies and, ultimately, attract new groups, students and collaborations. The CBD director will be decisive in making this possible.

The overall assessment of the department research output is excellent, with outstanding contributions from Teams 1, 2, 3 and 4. Some specific highlights include outstanding discoveries described in publications such as Nature, Nature Communications, Nature Genetics, PLoS Genetics among others. In total, the department published 284 articles, of which 137 are in leading first and/or last author positions. The CBD has demonstrated high quality technical work carried out in the two main thematic areas: genome sequence data analysis (Teams 3, 4 and 6) and biological imaging and modelling (the Teams 1, 2 and 5). The CBD has been able to attract a substantial amount of external funding, leading the Inception "Programmes d'investissement Avenir" and participating to the PRAIRIE consortium. CBD teams secured multiple grants from ANR (both as coordinators and partners), FRM, local and charities funding's, and participates to international funded consortia (H2020 and NIH). None of the groups have an ERC grant yet, but some are in a good position to get one in the near future.

The CBD has filed fourteen invention disclosures (including 7 from the Hub), has had six patents accepted (1 licensed), and created two spin-off companies, MTAnalytics and AVATAR Medical.

The contribution of the department to training through research is of high quality, both at the doctoral, and postdoctoral levels, with 32 PhD students and seventeen postdoctoral fellows trained. The courses supplied by the department (particularly the Hub) are excellent. The CBD's life and organization are very good. However, the department staff feel there is a lack of general and active communication. The CBD suffers from the sex/gender biases, common within STEM (science, technology, engineering and mathematics). While this problem was acknowledged, a more concerted effort will be required to address the many facets of this important problem.

Some of the department's scientific projects are outstanding, as is the potential of some of the teams, but a comprehensive scientific strategy has not yet been sufficiently elaborated.

At the time of the evaluation, it was announced that the Hub would be moving to a new department, one that hosts other research support and service groups, where it will continue its current activities.



Given the very positive track record of the Hub in terms of contribution to research projects and training, as well as its general expertise in bioinformatics, it will be important to carefully plan its future to maintain this capacity while at the same time allowing it to adapt to evolving needs, including the need for increased technical specialization among the research engineers, as well as the ever increasing need for embedded bioinformaticians in experimental laboratories. The evaluation reports of Hceres are available online: <u>www.hceres.com</u>

Evaluation of clusters of higher education and research institutions Evaluation of higher education and research institutions Evaluation of research Evaluation of doctoral schools Evaluation of programmes International evaluation and accreditation



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