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## PhD opportunity - Epigenetic regulation of Transposable Elements and cell cycle checkpoints during the development of the nervous system in *Drosophila*

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This PhD opportunity is offered through the [BEST Doctoral Programme](#), led by the **University of Toulouse** and co-funded by the **European Union** through **Horizon Europe – Marie Skłodowska-Curie Actions (MSCA COFUND)** and the **Toulouse Initiative for Research's Impact on Society (TIRIS)**. Thanks to this programme, **19 doctoral candidates** will be recruited through an international co-supervision scheme across three major TIRIS thematic pillars : Health & Well-being, Global Changes and Sustainable Transitions. The entire recruitment process will take place between November 2026 and April 2027 and will be managed by the **University of Toulouse (UT)**.

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|---------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|
| <b>Host Institution</b>                                                         | <a href="#">Center for Integrative Biology (CBI), Centre National de la Recherche Scientifique, University of Toulouse, France</a> |
| <b>Supervisor</b>                                                               | Luisa Di Stefano - <a href="#">Chromatin and Genome Silencing team</a>                                                             |
| <b>Co-supervising institution</b>                                               | BHU, India                                                                                                                         |
| <b>Co-supervisor</b>                                                            | Richa Arya                                                                                                                         |
| <b>Contract duration:</b> 36-month <b>Starting date:</b> September/October 2027 |                                                                                                                                    |

### Research topic

How multicellular organisms regulate their size remains a fundamental question in biology. Accurate cell cycle control ensures that cells divide at the appropriate time and location, supporting the overall growth and maintenance of organ size. In addition to the traditional cell cycle, several variations play specialized roles in distinct biological contexts. The central nervous system (CNS), in both mammals and *Drosophila*, is a complex tissue that utilizes diverse cell cycle processes beyond the conventional mitotic cycle—including the endocycle—to meet the intricate demands of neural development, maintenance, and function. Chromatin structure and function are central to cell cycle regulation, with histone modifications playing a key role in chromatin dynamics. Our research has shown that loss of the histone demethylase dLsd1 results in reduced organ size, including microcephaly, increased apoptosis, and disrupted cell cycle progression. Additionally, we observe a significant rise in the number of glial nuclei in the *Drosophila* CNS. dLsd1 is a chromatin factor essential for repressing gene and transposable element (TE) expression. TEs are mobile genetic elements that can cause genomic instability. However, the connection between epigenetic disruption

of gene and TE silencing and cell cycle defects following dLsd1 depletion in CNS homeostasis remains unexplored. Here, we propose an integrated approach combining genetics and genomics to investigate the cellular and molecular mechanisms by which dLsd1 regulates gene and TE silencing, cell cycle and normal CNS development.

Understanding how chromatin structure, gene and TE expression, and cell cycle regulation intersect to determine organ size could yield crucial insights into disorders marked by abnormal organ growth and development, such as cancer and microcephaly.

**Keywords:** chromatin, transposable elements, cell cycle, central nervous system, drosophila

## Context

Tissue growth and the achievement of desired organ size depend on diverse cellular cycling strategies. Within the *Drosophila* CNS, for instance, neural stem cells (NSCs) follow the canonical cell cycle, whereas several glial cells utilize specialized mechanisms like the endocycle, endomitosis, or acytokinetic mitosis to become polyploid. The regulation of these diverse mechanisms is still poorly understood. The histone demethylase LSD1 is a key regulator of cell proliferation and differentiation. Building on the Di Stefano lab's findings that dLsd1 depletion results in microcephaly and altered cell cycle progression, this collaborative research between the Arya and Di Stefano labs aims to unravel how dLsd1-mediated epigenetic control of the genome regulates diverse cell division mechanisms and overall organ size in the *Drosophila* CNS.

## International Co-supervision

The student will be co-supervised by Luisa Di Stefano at the Center for Integrative Biology in Toulouse and by Richa Arya at Department of Zoology, BHU, India. The supervisors will propose research questions, assist in the planning and scheduling of the work, and will provide theoretical and methodological advice. The supervisors, together with other members of the lab, will teach the student the techniques used in the lab. The student will have regular weekly meetings with the supervisors and will present his/her data at the lab meeting every three months. Regular meetings online (every month) and in person (at least two times during the course of the project) will also be held between the French and Indian partners. A part of the work will be conducted in India. The student's work will also be evaluated by the individual thesis committee members every year, and he/she is expected to present his/her project at the departmental seminars and at national/international conferences.

## Experience/Skills required :

- Hold, by 23 November 2026, a Master's degree or an equivalent qualification granting access to doctoral studies in France and not hold a doctoral degree.
- Have not resided in France or carried out your main activity in France for more than 12 months during the 36 months immediately preceding 23 November 2026. Periods of stay as a tourist, refugee, or time spent in national service, are not considered as residency.
- Have a B2 level of English
- Passionate about science and motivated to learn about chromatin dynamics in the CNS
- Rigorous and reliable and able to record and report results with clarity
- Team player with good organizational skills

## Application Process

**Call for application - 23 November 2026**

Applications must be submitted online through the application platform : [edd-projets.utoulouse.fr](http://edd-projets.utoulouse.fr)

**Please contact us at [isabelle.saves@utoulouse](mailto:isabelle.saves@utoulouse) before applying, or if you have any questions regarding CBI or the recruitment process. Please use the following email subject line: BEST call – [Supervisor name].**

**Eligibility check** - 24 to 30 November 2026

**Written evaluation** - 4 December to 15 January 2027

**Consolidation of pre-selected projects** - 19 January to 19 March 2027

**Oral evaluation** - 29 March to 4 April 2027

**Result** - April 2027

**Starting date:** September/October 2027 (Contract duration: 36 months)

For additional information: <https://doctorat.univ-toulouse.fr/cofund-best>

Contact : [best-helpdesk@utoulouse.fr](mailto:best-helpdesk@utoulouse.fr)

## About the CBI

Located in Toulouse, in the sunny southwestern of France, the [Center for Integrative Biology \(CBI\)](#) is a **fundamental biology research institute** affiliated with the [National Center for Scientific Research \(CNRS\)](#) - the largest public research organization in France - and the University of Toulouse. The institute brings together **47 research groups**.

The CBI aims to understand the mechanisms, dynamics and behaviors of living organisms, to advance knowledge on the current societal challenges. Research at the CBI use multidisciplinary and multi-scale approaches, from isolated molecules to whole organisms and animal societies, applied to numerous model organisms, from bacteria to man.

CBI offers an **international and interdisciplinary research environment**, with access to advanced facilities and opportunities for scientific and career development. The institute benefits from **a collaborative and international scientific culture**, and is committed to promoting equality, diversity and inclusivity.