

Short Curriculum vitae of Giacomo Cavalli

Name: Giacomo CAVALLI
Gender: Male
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Citizenship: Italian and French



Current position: Group leader at the Institut de Génétique Humaine (IGH)
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Google scholar: <http://scholar.google.com/citations?user=5oWMD9EAAAAJ&hl=en>

ResearchGate: https://www.researchgate.net/profile/Giacomo_Cavalli

Linkedin: <https://www.linkedin.com/pub/giacomo-cavalli/15/545/2b4>

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Past positions

- 1991-1994: Ph.D. training: Institut für Zellbiologie, ETH-Zürich, Switzerland. Ph.D. in Natural Sciences with a thesis bearing the title: Transcription Dependent Chromatin Transitions in the Yeast *Saccharomyces cerevisiae*. Supervisors Prof. Fritz Thoma and Prof. Theodor Koller. PhD thesis obtained on Dec 23, 1994
- 1995-1998: Post doctoral training: Renato Paro laboratory. Regulation of gene expression by Polycomb Group and trithorax Group proteins. Heidelberg. Germany.
- 1999-2002: 3-years Junior group leader position of the CNRS (startup grant "ATIPE"). Institute of Human Genetics, UPR 1142 of the CNRS. Montpellier, France.

Awards and recognition

- 2008 - Académie des Sciences–Institut de France: Grand prix quadriennal Paul Doisteau Émile Bludet"
- 2008 – Election to EMBO Member
- 2009 – 1st Advanced Investigator Grant (AdG) of the European Research Council (ERC), "FlyingPolycomb".
- 2011 – Silver medal of the Centre National de la Recherche Scientifique
- 2012 – Award of the « Fondation Allianz – Fondation de l'Institut de France »
- 2013 – Award «Equipe à l'Honneur de Association pour la Recherche sur le Cancer (ARC)»
- 2015 – Top 1% researcher in ResearcGate
- 2017 – 2nd ERC AdG, "3DEpi".
- 2020 – Nominated chair of the LS2 Coordinator Grant panel of the ERC
- 2020 – Grand Prix of the Fondation pour la Recherche Médicale
- 2022 – Nominated chair of the LS2 Coordinator Grant panel of the ERC
- 2022 – Election to member of the French Academy of Sciences
- 2023 – Highly Cited Researcher – ISI Clarivate
- 2023 – 3rd ERC AdG, "WaddingtonMemory".
- 2024 – Inclusion as a highly ranked scholar in "ScholarGPS" and "Research.com".

Major lab grants

Three ERC Advanced grants (FlyingPolycomb, AdG 2008; 3DEpi, AdG 2017, WaddingtonMemory, AdG 2023), European Horizon 2020 MSCA-ITN-2018 ChromDesign, Horizon 2020 Elnfra-2015: MuG. Eu 6th framework program (NoE The Epigenome), Eu 7th framework program (NoE EpiGeneSys). Two HFSP grants (one in 1999, one in 2003), three ANR white grants (2006, 2015, 2018). Two Fondation ARC Programme labellisé, 2008 and 2013. One FRM grant, Innovative physicochemical studies for biology and medicine DEI20151234396. Two INCa grants (AAP PLBIO-2016 and AAP PLBIO-2018 PIT-MM). Chair of Excellence of the French Ministry of Science 2024, "EpigeneticMemories" (*declined in favour of the ERC grant "WaddingtonMemories"*).

Journal Editor

Science Advances; PLoS Genetics; Nucleus; PLoS ONE; Genomics, Proteomics & Bioinformatics; Epigenomes; Journal of Cancer Epigenetics.

Journal and Grant Reviewer, panel member

Peer reviewer for many journals, including Nature, Science and Cell. Grant reviewer for the main agencies, including ERC, NIH, Human Frontiers (HFSPO), MRC, Wellcome trust, DFG etc, Member of various international review panels. Chair of the ERC CoG LS2 panel

Session Chair of more than 20 international meetings in Europe, USA and Asia from 2005 (including Keystone, Gordon, FASEB, FEBS and EMBO conferences).

Organizer of international meetings, including the EMBO Conference Series on Nuclear Structure and dynamics 2005, 2007, 2009 and 2011, the 2016 Aviesan meeting on “Architecture and plasticity of the cell nucleus, the 2017 Barcelona Biomed Conference on “Multidimensional Genomics: the 3D/4D organization of chromatin”, the 2018, 2020, 2022, 2024 Fusion meeting on “Epigenetics: from mechanisms to disease”, 2022 FASEB SRC conference on Transcription, Chromatin, and Epigenetics and the 2025 Gordon Research Conference on Genome Architecture in Cell Fate and Disease

Scientific Advisory Board

2015-present: member of the SIAC Babraham Institute, Cambridge UK and of the Scientific Commission of the Institut Curie Research Centre, Paris, France

Mentoring activity

In his lab, Giacomo Cavalli has mentored 19 PhD students and 2 postdocs.

Every year he organizes a “PhDay”, where PhD students discuss specific issues linked to their unfolding path in science in an informal setting. He also accompanies their progress to later stages of their career, either in the French system or abroad. On average, 90% of the French PhD students quit scientific research after their PhD. In contrast, only two of 19 who earned a PhD in his lab moved out of science. The other PhD students moved on to post-doctoral positions in prestigious labs and researcher positions and earned positions, mostly in academia, or in biomedical industry for a few of them. The first PhD graduate is now senior PI and obtained a Consolidator ERC grant (Jérôme Déjardin). As senior author, he published papers in Cell, Mol. Cell, Nature Methods, Nature Commun., Sci. Adv. and other top journals. Several other PhD graduates have now obtained permanent positions in the French system.

Of the 21 postdocs he supervised and who left the lab, 18 stayed in science. **Nine of them became PIs in prestigious research institutions:** Mythily Ganapathy is Associate Professor of Pathology & Cell Biology at Columbia University. She is at the department of Pathology and Cell biology. Nicola Iovino is Max Planck Director and currently is Director of the MPI Institute for Epigenetics at Freiburg, Germany. Sergey Lavrov is at the Moscow Institute of Molecular Genetics of the Russian Academy of Sciences. Tom Sexton is PI at the IGBMC in Strasbourg, France. Boyan Bonev is PI at the Biomedical Center (BMC) Ludwig-Maximilians-University Munich, Germany. Jia-Ming Chang is Assistant professor and PI at the Department of Computer Science, National Chengchi University, Taiwan. Stefan Grob is junior PI at the IBMP Strasbourg, France. Satish Sati is Research Track Assistant Professor group at the University of Pennsylvania and Max Fitz-James is opening his lab at Oxford University in 2024. Two more have been now hired as senior CNRS researchers in my lab (Frédéric Bantignies and Thierry Cheutin). Bernd Schüttengruber was hired as an INSERM senior research fellow in the Cavalli lab. François Juge was hired as permanent staff researchers by the CNRS, France. Inmaculada Gonzalez is Pasteur senior researcher and Julio Mateos is research engineer at the advanced imaging facility of IGH, where he develops superresolution microscopy. The others are now post docs abroad. Finally, Anne-Marie Martinez, joined the lab in 2003 when she was assistant professor. She has then been appointed Associate and, in 2016, became Professor in Genetics (exceptional class) at the University of Montpellier and deputy director of the University Life Science department. Therefore, the Cavalli lab nurtures excellence and professional success.

As IGH director (2011-2014), Giacomo Cavalli promoted junior PI talents by creating junior PI double-mentoring system (one international mentor plus mentorship by the head of the department), granting them attendance to an EMBO research management course as well as having yearly discussions on their research progress. 2 junior PIs were tenured during his directorship. Finally, he engaged in the promotion of successful paths for women in science at IGH and in society. Two of the three PIs that have been hired under his mandate are women: Reini Luco and Sophia Kossida (the third PI being Hervé Seitz). Giacomo Cavalli also nominated Geneviève Almouzni for the EMBO/FEBS Women in Science (WIS) Award, which was presented to her at the FEBS meeting in Saint-Petersburg in a plenary session in which Giacomo Cavalli pronounced the laudation talk.

Selected publications of Giacomo CAVALLI (of 145, H-index = 67, over 23,000 citations as of September 2024)

- 1) Fitz-James, M.H., Sabaris, G., Sarkies, P., Bantignies, F. & **Cavalli, G** (2024). Interchromosomal contacts between regulatory regions trigger stable transgenerational epigenetic inheritance in *Drosophila*. **Molecular Cell** doi: 10.1016/j.molcel.2024.11.021.
- 2) Parreno, V*, Loubiere, V*, Schuettengruber, B., Fritsch, L., Rawal, C.C., Erokhin, M., Györfly, B., Normanno, D., Di Stefano, M., Moreaux, J., Butova, N., Chiolo, I., Chetverina, D., Martinez, A-M#, and **Cavalli, G.#** (2024). Transient loss of Polycomb components induces an epigenetic cancer fate. **Nature** 629, 688-696. DOI 10.1038/s41586-024-07328-w.
- 3) Ringel, A.R., Szabo, Q., Chiariello, A.M., Chudzik, K., Schöpflin, R., Rothe, P., Mattei, A.L., Zehnder, T., Harnett, D., Laupert, V., Bianco, S., Hetzel, S., Glaser, J., Phan, M., Schindler, M., Ibrahim, D., Paliou, C., Esposito, A., Prada-Medina, C. A., Haas, S. A., Giere, P., Vingron, M., Wittler, L., Meissner, A., Nicodemi, M., **Cavalli, G.**, Bantignies, F., Mundlos, S., Robson, M. I. (2022). Promoter repression and 3D-restructuring resolves gene regulation conflicts in evolutionarily rearranged genomes. **Cell** 185, 3689-370. DOI 10.1016/j.cell.2022.09.006.
- 4) Szabo, Q., Donjon, A., Jerkovic, I., Papadopoulos, G.L., Cheutin, T., Bonev, B., Nora, E., Bruneau, B.G., Bantignies, F., and **Cavalli, G.** (2020). Regulation of single-cell genome organization into TADs and chromatin nanodomains. **Nature Genetics** <https://doi.org/10.1038/s41588-020-00716-8>.
- 5) **Cavalli, G.*** and Heard, E.* (2019) Advances in epigenetics link genetics to the environment and disease. **Nature**, 571, 489-499 doi: 10.1038/s41586-019-1411-0
- 6) Bonev, B., Mendelson Cohen, N., Szabo, Q., Fritsch, L., Papadopoulos, G., Lubling, Y., Xu, X., Lv, X., Hugnot, J.-P., Tanay, A., and **Cavalli, G.** (2017). Multi-scale 3D genome rewiring during mouse neural development. **Cell** 171, 557-572.e24.
- 7) Schuettengruber, B., Bourbon, H., Di Croce, L., and **Cavalli, G.** (2017). Genome Regulation by Polycomb and Trithorax: 70 years and counting. **Cell** 171, 34-57.
- 8) Ciabrelli, F., Comoglio, F., Fellous, S., Bonev, B., Ninova, M., Szabo, Q., Xuéreb, A., Klopp, C., Aravin, A. Paro, R., Bantignies, F., and **Cavalli, G** (2017). Stable Polycomb-dependent transgenerational inheritance of chromatin states in *Drosophila*. **Nature Genetics** 49, 876-886, doi:10.1038/ng.3848
- 9) Loubiere, V., Delest, A., Thomas, A., Bonev, B., Schuettengruber, B., Sati, S., Martinez, AM., and **Cavalli, G.** (2016) Coordinate redeployment of PRC1 proteins suppresses tumor formation during *Drosophila* development. **Nature Genetics** 48, 1436-1442, doi:10.1038/ng.3671
- 10) Sexton, T., and **Cavalli, G.** (2015). The role of chromosome domains in shaping the functional genome. **Cell**, 160, 1049-1059
- 11) Sexton, T., Yaffe, E., Kenigsberg, E., Bantignies, F., Leblanc, B., Hoichman, M., Parrinello, H., Tanay, A., and **Cavalli, G.** (2012). Three-dimensional folding and functional organization principles of the *Drosophila* genome. **Cell** 148, 458-472
- 12) Bantignies, F., Roure, V., Comet, I., Leblanc, B., Schuettengruber, B., Bonnet, J., Tixier, V., Mas, A., and **Cavalli, G.** (2011). Polycomb-dependent regulatory contacts between distant Hox loci in *Drosophila*. **Cell** 144, 214-26.
- 13) Martinez, AM., Schuettengruber, B., Sakr, S., Janic, A., Gonzalez, C., and **Cavalli, G.** (2009). Polyhomeotic has a tumor suppressor activity mediated by repression of Notch signaling. **Nature Genetics** 41:1076-82.
- 14) Grimaud, C., Bantignies, F., Pal-Bhadra, M., Ghana, P., Bhadra, U., and **Cavalli, G.** (2006). RNAi Components Are Required for Nuclear Clustering of Polycomb Group Response Elements. **Cell** 124, 957-971
- 15) Déjardin, J., Rappailles, A., Cuvier, O., Grimaud, C., Decoville, M., Locker, D., and **Cavalli, G.** (2005). Recruitment of *Drosophila* Polycomb Group proteins to chromatin by DSP1. **Nature**, 434, 533-538; doi:10.1038/nature03386.

Patent

1) 2/11/2016: Method for the in vitro prognosis of individuals having Multiple Myeloma and method for the treatment thereof. Dr Jerome Moreaux, University of Montpellier; Laurie Herviou, CNRS; Dr Alboukadel Kassambara, CHU Montpellier; Dr Giacomo Cavalli, CNRS, European Patent number EP 16306436.3

2) Method for the in vitro prognosis of individuals having Multiple Myeloma and method for the treatment thereof. Dr Jerome Moreaux, University of Montpellier; Laurie Herviou, CNRS; Dr Alboukadel Kassambara, CHU Montpellier; Dr Giacomo Cavalli, CNRS. United States Patent No. US 11,578,369 B2. February 14, 2023.

Short Biography

Giacomo Cavalli has studied Biology at the University of Parma. In 1991, he did his PhD in Zürich at the University of Science and Technology (ETH), working on chromatin structure and function in yeast with Fritz Thoma. From 1995 to 1998, he was postdoc in the laboratory of Prof. Renato Paro

at the University of Heidelberg. In 1999, he moved to IGH to set up a junior lab and stayed at IGH ever since. Giacomo Cavalli made seminal contributions in the field of epigenetics. He discovered that epigenetic inheritance of new phenotypes can occur independently on changes of the DNA sequence. His lab also discovered that the three-dimensional organization of chromosome in the cell nucleus is an epigenetically heritable trait that plays an important gene regulatory role. The Cavalli lab identified 3D structural chromosomal domains dubbed Topologically Associating Domains or TADs and described their internal structure. Finally, they showed that PcG proteins have tumor suppression activity in flies and, strikingly, even a transient reduction in the activity of Polycomb components results in malignant, immortal tumors that continue to progress after restoration of normal Polycomb levels. Their data show that cancer can arise by epigenetic dysregulation in the absence of driver DNA mutations. Giacomo Cavalli organized major international conferences and is appointed as member of distinguished scientific boards. He has received numerous awards and distinctions, including an EMBO membership, the CNRS silver medal, the Allianz Foundation price, the Grand Prix of the Fondation pour la Recherche Médicale and three advanced ERC grants. In 2022, he has been elected member of the French Academy of Sciences and in 2023 he was nominated highly cited scientists by Clarivate.