

# Florian Wünnemann

POSTDOC IN THE GROUP OF DENIS SCHAPIRO

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**Research and scientific interests:** Spatial OMICS, Cardiovascular disease, Human genetics, Bioinformatics, Machine Learning, Computer vision

## 🧪 Research experience

### University Hospital Heidelberg

POSTDOC IN THE SCHAPIRO LAB

Heidelberg, Germany

22-Jan-22 - ongoing

- Investigation of cellular neighbourhoods and tissue architecture in myocardial infarction models using spatial OMICS technologies

### Montreal Heart Institute

POSTDOC IN THE LETTRE LAB

Montreal, Canada

18-Aug-22 - 21-Aug-22

- Projects focused on high-throughput CRISPR screens, polygenic risk scores, genetics of heart valve disease and development of single-cell screens to investigate human cellular traits.

### Universite de Sherbrooke

PROFESSIONNEL RECHERCHE NIV. II

Remote work

19-Jan-22 - 16-Jan-22

- Part of the GenAP initiative ([www.genap.ca](http://www.genap.ca)) as single-cell expert, to include single-cell tools into the GenAP2 platform. Development of Galaxy tools, Rshiny applications and docker containers for single-cell analysis.

### IEB, University of Münster

STUDENT RESEARCH ASSISTANT

Münster, Germany

11-Sep-22 - 12-Jul-22

- Acquisti group: Analysis of genomes and metagenomes in the context of nutrient limitation and fertilization.

### IEB, University of Münster

STUDENT ASSISTANT

Münster, Germany

11-Mar-22 - 11-May-22

- Bornberg-Bauer group

## 🎓 Education

### University of Münster / CHU Sainte Justine Research Center

PH.D. (DR.RER.NAT) - LIFE SCIENCES

Münster, Germany / Montreal, Canada

Apr.2014 - Apr.2018

- Thesis title: The role of genetic factors in pathogenesis and progression of cardiac malformations

### University of Münster

MSc IN LIFE SCIENCES

Münster, Germany

Oct.2011 - Feb.2014

- Thesis title: Functional and genetic characterization of a novel arrhythmic syndrome

### University of Münster

BSc IN LIFE SCIENCES

Münster, Germany

Oct.2008 - Sep.2011

- Thesis title: Impact of nutrient limitation in insects: Comparative genomics of the pea aphid and the human body louse

## 💰 Funding History

WALTER-BENJAMIN POSTDOCTORAL POSITION FOR 24 MONTHS, DEUTSCHE FORSCHUNGSGEMEINSCHAFT (DFG)

2022 - ongoing

POSTDOCTORAL TRAINING SCHOLARSHIP (CANADIAN CITIZENS AND PERMANENT RESIDENTS), FONDs DE RECHERCHE QUÉBEC

SANTÉ (FRQS)

2019 - 2021

## 🏆 Achievements and Awards

2021/06	Poster prize: Prix Fonds de recherche du Québec (FRQS) (Recherche fondamentale doctorale / Postdoc)	Montreal, Canada
2019/06	Best oral presentation award, 22nd Montreal Heart Institute research day	Montreal, Canada
2017/05	Best oral presentation award, 32nd student congress at the CHU Sainte-Justine	Montreal, Canada
2016/05	Markwald award for best oral presentation, Weinstein Cardiovascular Development and Regeneration Conference 2016	Durham, USA

## Invited Presentations

### Resolve Biosciences - Immersive Spatial Biology Experience

Basel, Switzerland

MOLECULAR CARTOGRAPHY HELPS REVEAL IMMUNE CELL INFILTRATION ROUTES AND THEIR MICROENVIRONMENTS DURING ACUTE MYOCARDIAL INFARCTION.

29.09 - 29.09

### Resolve Biosciences - Immersive Spatial Biology Experience

Heidelberg, Germany

MOLECULAR CARTOGRAPHY HELPS REVEAL IMMUNE CELL INFILTRATION ROUTES AND THEIR MICROENVIRONMENTS DURING ACUTE MYOCARDIAL INFARCTION.

26.09 - 26.09

## Presentations

### American Society of Human Genetics (ASHG) Meeting 2019

Houston, Texas, USA

PRIORITIZATION OF GENOMIC LOCI FOR CORONARY ARTERY DISEASE USING TARGETED CRISPR SCREENS FOR ENDOTHELIAL DYSFUNCTION

15.10.2019 - 19.10.2019

### XXIIe Journée de la recherche ICM

Montreal, Canada

VALIDATION OF GENOME-WIDE POLYGENIC RISK SCORES FOR CORONARY ARTERY DISEASE IN FRENCH CANADIANS

06.06.2019 - 06.06.2019

### 7th annual MGSE Symposium

Münster, Germany

SINGLE CELL LANDSCAPE OF MAMMALIAN HEART MATURATION

21.03.2018 - 22.03.2018

### American Society of Human Genetics (ASHG) Meeting 2017

Orlando, Florida, USA

IDENTIFICATION OF A NOVEL MARKER FOR VALVE MATURATION: LOSS OF ADAMTS19 FUNCTION CAUSES PROGRESSIVE VALVE DISEASE IN MICE AND MEN

18.10.2017 - 18.10.2017

### Congrès de la recherche des étudiantes des cycles supérieurs et des post-doctorants en recherche au CHU Sainte-Justine

Montreal, Canada

HEART VALVE DYSFUNCTION IN MEN AND MICE IS CAUSED BY LOSS OF FUNCTION MUTATIONS IN ADAMTS19, A NOVEL MARKER FOR VALVULAR INTERSTITIAL CELLS

26.05.2017 - 26.05.2017

### Weinstein Cardiovascular Development and Regeneration Conference 2016

Durham, North Carolina, USA

LOSS OF ADAMTS19, A NOVEL MARKER FOR VALVULAR INTERSTITIAL CELL POPULATIONS DURING VALVE MATURATION, CAUSES AORTIC VALVE DYSFUNCTION

18.05.2016 - 21.05.2016

### Evolgen, collaborative meeting on genome evolution

Ciążeń, Poland

ACTRANDB: AN ONLINE DATABASE FOR ACANTHAMOEBA CASTELLANI TRANSCRIPTS,

27.06.2012 - 28.06.2012

### 2nd Muenster graduate school evolution symposium

Münster, Germany

BIOGEOCHEMISTRY MEETS MOLECULAR EVOLUTION VIA METAGENOMICS: TRACING NITROGEN FLUXES FROM ECOSYSTEMS TO GENOMES IN MICROBIAL COMMUNITIES

18.06.2012 - 19.06.2012

## Poster presentations

### XXIIIe Journée de la recherche ICM

Montreal, Canada

CRISPR PERTURBATIONS AT MANY CORONARY ARTERY DISEASE LOCI IMPAIR VASCULAR ENDOTHELIAL CELL FUNCTIONS

17.06.2021 - 17.06.2021

### Cold Spring Harbor Laboratories: The Biology of Genomes

Virtual

CRISPR PERTURBATIONS AT MANY CORONARY ARTERY DISEASE LOCI IMPAIR VASCULAR ENDOTHELIAL CELL FUNCTIONS

11.05.2021 - 14.05.2021

### Weinstein Cardiovascular Development and Regeneration Conference

Nara, Japan

A SINGLE-CELL PERSPECTIVE ON GROWTH AND MATURATION PATHWAYS IN THE MOUSE HEART.

16.05.2018 - 18.05.2018

### American Society of Human Genetics (ASHG) 2014

San Diego, California, USA

DE NOVO MUTATION IN SOX18 CAUSES A NOVEL FORM OF HYPOTRICHOSIS-LYPHEDEMA-TELANGIECTASIA WITH SEVERE VASCULAR DEFECTS

18.10.2014 - 22.10.2014

## Preprints

1. Wünnemann, F., Tadjó, T. F., Beaudoin, M., Lalonde, S., Lo, K. S., & Lettre, G. (2021). CRISPR perturbations at many coronary artery disease loci impair vascular endothelial cell functions. *bioRxiv*.
2. Churakov, G., Kuritzin, A., Chukharev, K., Zhang, F., Wünnemann, F., Ulyantsev, V., & Schmitz, J. (2020). A 4-lineage statistical suite to evaluate the support of large-scale retrotransposon insertion data to reconstruct evolutionary trees. *bioRxiv*.

## Publications

1. Biermann, J., Melms, J. C., Amin, A. D., Wang, Y., Caprio, L. A., Karz, A., Tagore, S., Barrera, I., Ibarra-Arellano, M. A., Andreatta, M., Fullerton, B. T., Gretarsson, K. H., Sahu, V., Mangipudy, V. S., Nguyen, T. T. T., Nair, A., Rogava, M., Ho, P., Koch, P. D., ... Izar, B. (2022). Dissecting the treatment-naïve ecosystem of human melanoma brain metastasis. *Cell*, 185(14), 2591–2608.e30.
2. Heckel, E., Cagnone, G., Agnihotri, T., Cakir, B., Das, A., Kim, J. S., Kim, N., Lavoie, G., Situ, A., Pundir, S.others. (2022). Triglyceride-derived fatty acids reduce autophagy in a model of retinal angiomatous proliferation. *JCI Insight*, 7(6).
3. Audain, E., Wilsdon, A., Breckpot, J., Izarzugaza, J. M., Fitzgerald, T. W., Kahlert, A.-K., Sifrim, A., Wünnemann, F., Perez-Riverol, Y., Abdul-Khaliq, H.others. (2021). Integrative analysis of genomic variants reveals new associations of candidate haploinsufficient genes with congenital heart disease. *PLoS Genetics*, 17(7), e1009679.
4. Wünnemann, F., Ta-Shma, A., Preuss, C., Leclerc, S., Vliet, P. P. van, Oneglia, A., Thibeault, M., Nordquist, E., Lincoln, J., Scharfenberg, F.others. (2020). Loss of ADAMTS19 causes progressive non-syndromic heart valve disease. *Nature Genetics*, 52(1), 40–47.
5. Gould, R. A., Aziz, H., Woods, C. E., Seman-Senderos, M. A., Sparks, E., Preuss, C., Wünnemann, F., Bedja, D., Moats, C. R., McClymont, S. A.others. (2019). ROBO4 variants predispose individuals to bicuspid aortic valve and thoracic aortic aneurysm. *Nature Genetics*, 51(1), 42–50.
6. Luyckx, I., Kumar, A. A., Reyniers, E., Dekeyser, E., Vanderstraeten, K., Vandeweyer, G., Wünnemann, F., Preuss, C., Mazzella, J.-M., Goudot, G.others. (2019). Copy number variation analysis in bicuspid aortic valve-related aortopathy identifies TBX20 as a contributing gene. *European Journal of Human Genetics*, 27(7), 1033–1043.
7. Wünnemann, F., Sin Lo, K., Langford-Avelar, A., Busseuil, D., Dubé, M.-P., Tardif, J.-C., & Lettre, G. (2019). Validation of genome-wide polygenic risk scores for coronary artery disease in french canadians. *Circulation: Genomic and Precision Medicine*, 12(6), e002481.
8. Preuss, C., Wünnemann, F., & Andelfinger, G. (2017). At the heart of a complex disease “molecular genetics of congenital heart disease.” *eLS*, 1–9.
9. Gillis, E., Kumar, A. A., Luyckx, I., Preuss, C., Cannaerts, E., Van De Beek, G., Wieschendorf, B., Alaerts, M., Bolar, N., Vandeweyer, G.others. (2017). Candidate gene resequencing in a large bicuspid aortic valve-associated thoracic aortic aneurysm cohort: SMAD6 as an important contributor. *Frontiers in Physiology*, 8, 400.
10. Wünnemann, F., Kokta, V., Leclerc, S., Thibeault, M., McCuaig, C., Hatami, A., Stheneur, C., Grenier, J.-C., Awadalla, P., Mitchell, G. A.others. (2016). Aortic dilatation associated with a de novo mutation in the SOX18 gene: Expanding the clinical spectrum of hypotrichosis-lymphedema-telangiectasia syndrome. *Canadian Journal of Cardiology*, 32(1), 135–e1.
11. Preuss, C., Capredon, M., Wünnemann, F., Chetaille, P., Prince, A., Godard, B., Leclerc, S., Sobreira, N., Ling, H., Awadalla, P.others. (2016). Family based whole exome sequencing reveals the multifaceted role of notch signaling in congenital heart disease. *PLoS Genetics*, 12(10), e1006335.
12. Wünnemann, F., & Andelfinger, G. U. (2016). Molecular pathways and animal models of hypoplastic left heart syndrome. In *Congenital heart diseases: The broken heart* (pp. 649–664). Springer, Vienna.

13. Chetaille, P., Preuss, C., Burkhard, S., Côté, J.-M., Houde, C., Castilloux, J., Piché, J., Gosset, N., Leclerc, S., Wünnemann, F.others. (2014). Mutations in SGOL1 cause a novel cohesinopathy affecting heart and gut rhythm. *Nature Genetics*, 46(11), 1245.

## Computational skills

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- **General:** GWAS analysis, Exome/Genome variant calling, Plink, bedtools, Image analysis (Fiji, Napari, QuPath)
- **R:** Rshiny application development, Rmarkdown, Package development, OMICS data analysis (RNA-seq, single-cell OMICS), reticulate
- **Python:** Jupyter notebooks, basic computer vision applications, single-cell OMICS analysis
- **Containers:** Docker container creation, Singularity usage, Nextflow workflow creation and execution
- **Galaxy project:** Creation of galaxy tools and wrappers, setup of <https://spatialomics.usegalaxy.eu/>

## Languages

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- German (mother-language)
- English (fluent)
- French (fluent)
- Spanish (Beginner)