JAKE LEYHR - CV

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Current Position

Duke University **04/2024**
Postdoctoral Associate **- Present**
Laboratory of Professor David Sherwood
Department of Biology

Education

Uppsala University **2023**
PhD, Evolutionary Developmental Biology
Thesis: "*Musculoskeletal Development in Jawed Vertebrates: Gene Function, Cis-Regulation, and 3D Phenotypes in Zebrafish*"
Advisor: Dr. Tatjana Haitina, Co-advisors: Dr. Sophie Sanchez; Professor Per Ahlberg

Uppsala University **2018**
MSc, Biology (Evolutionary Biology)
Thesis: *"Characterization of Transcription Factor Regulation During the Development of Zebrafish Craniofacial Structures"*
Advisor: Dr. Tatjana Haitina

University of Exeter **2016**
BSc (Hons), 2:1, Biological Sciences
Thesis: *"Development of a Cell-Free Alkane Biosensor"*
Advisor: Professor John Love

Publications

1. **Leyhr, J.**, Chi, Q., Zeng, L., Li, X., Cao, B., Shen, EZ., Zou, W., Sherwood, DR. (**2026**). WormTagDB: A Systematic Survey of Endogenously Tagged Proteins in *C. elegans* and Roadmap Towards the Tagged Proteome. *G3 Genes|Genomes|Genetics*. doi: 10.1093/g3journal/jkag068
2. Kenny-Ganzert, IW.*, Basta, LP.*, Wang, L., Chi, Q., Kelley, LC., Su, CY., **Leyhr, J.**, Morton, KS., Meyer, JN., and Sherwood, DR. (**2026**). Specialized high-capacity mitochondria fuel cell invasion. *Current Biology*, *In Press*. doi: 10.1016/j.cub.2026.03.023
3. Grohganz, M., **Leyhr, J.**, Johanson, Z., Haitina, T., Sanchez, S., Dollman, K., Stundl, J., Bronner, M.E., Fraser, G.J., Donoghue, P.C.J. (**2025**). Investigating the Morphogenesis and Replacement of Lamprey Toothlets Using Synchrotron Imaging. *Journal of Morphology*, 286(10), e70094. doi: 10.1002/jmor.70094
4. Stundl, J., Rajan, A.R.D., Urrutia, H.A., **Leyhr, J.**, Stundlova, J., Solovieva, T., Haitina, T., Sanchez, S., Musilova, Z., Martik, ML., Bronner, ME. (**2025**). Acquisition of neural crest promoted thyroid evolution from chordate endostyle. *Science Advances,* 11(32), eadv2657. doi: 10.1126/sciadv.adv2657
5. Ford, C., De Sena-Tomás, C., Wun, T.T.R., Aleman, A.G., Rangaswamy, U., **Leyhr, J.**, Nuñez, M.I., Gao, C.Z., Nim, H.T., See, M., Coppola, U., Waxman, J.S., Ramialison, M., Haitina, T., Smeeton, J., Sanges, R., Targoff, K.L. (**2025**). Nkx2.7 is a conserved regulator of craniofacial development. *Nature Communications,* 16, 3802. doi: 10.1038/s41467-025-58821-3
6. **Leyhr, J.**, Haitina, T., Bird, NC. (**2025**). Hidden in plain sight: does the first intercostal ligament help to stabilize the Weberian apparatus? *Journal of Anatomy*, 246(2), p288-298. doi: 10.1093/molbev/msae246
7. Mayeur, H., **Leyhr, J.**, Mulley, J., Leurs, N., Michel, L., Sharma, K., Lagadec, R., Aury, JM., Osborne, O.G., Mulhair, P., Poulain, J., Mangenot, S., Mead, D., Smith, M., Corton, C., Oliver, K., Skelton,

J., Betteridge, E., Dolucan, J., Dudchenko, O., Omer, AD., Weisz, D., Lieberman-Aiden, E., McCarthy, S., Sims, Y., Torrance, J., Tracey, A., Howe, K., Baril, T, Hayward, A, Martinand-Mari, C., Sanchez, S., Haitina, T., Martin, K, Korsching, SI., Mazan, S., Debiais-Thibaud, M. (**2024**). The sensory shark: high-quality morphological, genomic and transcriptomic data for the small-spotted catshark *Scyliorhinus canicula* reveal the molecular bases of sensory organ evolution in jawed vertebrates. *Molecular Biology and Evolution*, 41(12), msae246, doi: 10.1101/2024.05.23.595469

8. Harry, CJ., Hibshman, JD., Damatac, A., Davidson, PL., Estermann, MA., Flores-Flores, M., Holmes, CM., Lázaro, J., Legere, EA., **Leyhr, J.**, Thendral, SB., Vincent, BA., Goldstein, B. (**2024**). Protocol for fluorescent live-cell staining of tardigrades. *STAR Protocols*, 5:103232. doi: 10.1016/j.xpro.2024.103232
9. **Leyhr, J.**, Sanchez, S., Dollman, KN., Tafforeau, P., Haitina, T. (**2023**). Enhanced contrast synchrotron X-ray microtomography for describing skeleton-associated soft tissue defects in zebrafish mutants. *Frontiers in Endocrinology*, 14:1108916, doi: 10.3389/fendo.2023.1108916
10. **Leyhr, J.***, Waldmann, L.*, Filipek-Górniok, B., Zhang, H., Allalou, A., Haitina, T. (**2022**). A novel cis-regulatory element drives early expression of Nkx3.2 in the gnathostome primary jaw joint. *eLife* 11:e75749, doi: 10.7554/eLife.75749
11. Waldmann, L.*, **Leyhr, J.***, Zhang, H., Allalou, A., Öhman-Mägi, C., Haitina, T. (**2022**). The Role of Gdf5 in the Development of the Zebrafish Fin Endoskeleton. *Developmental Dynamics*, 251(9), p1535-1549, doi: 10.1002/dvdy.399 (**Cover feature**)
12. Waldmann, L.*, **Leyhr, J.***, Zhang, H., Öhman-Mägi, C., Allalou, A., Haitina, T. (**2021**). The Broad Role of Nkx3.2 in the Development of the Zebrafish Axial Skeleton. *PLoS ONE*, 16(8), e0255953, doi: 10.1371/journal.pone.0255953
13. Janssen, R., Andersson, E., Betnér, E., Bijl, S., Fowler, W., Höök, L., **Leyhr, J.**, Landström, E., Mannelqvist, A., Panara, V., Smith, K., Tiemann, S. (**2018**). Embryonic expression patterns and phylogenetic analysis of panarthropod sox genes: Insight into nervous system development, segmentation and gonadogenesis. *BMC Evolutionary Biology*, 18(88), doi: 10.1186/s12862-018-1196-z

* Equal contribution.

Conference Presentations

- **Leyhr, J.**, Sherwood, D. Anchor Cell Invasion Relies on the Proteasome. Poster presentation delivered at the *83rd Annual Meeting of the Society for Developmental Biology* (San Juan, Puerto Rico – June **2025**).
- **Leyhr, J.** High-resolution tomography for comparative and developmental anatomy. Oral presentation delivered at Uppsala University Tomo Day (Uppsala, Sweden – May **2025**).
- Grohganz, M., **Leyhr, J.**, Johanson, Z., Haitina, T., Sanchez, S., Dollman, K., Stundl, J., Bronner, M., Fraser, G., Donoghue, P. Investigating the morphogenesis and replacement of lamprey toothlets using synchrotron imaging. Poster presentation delivered at the *17th International Symposium on Early and Lower Vertebrates* (Rimouski, Canada - June **2024**).
- **Leyhr, J.**, Leflaëc, E., Debiais-Thibaud, M., Bird, NC., Dollman, K., Tafforeau, P., Sanchez, S., Haitina, T. DICE-PPC-SRμCT for describing anatomy, mutant phenotypes, and tissue organisation in three dimensions at near-histological resolution. Poster presentation delivered at the *82nd Annual Meeting of the Society for Developmental Biology* (Chicago, USA – July **2023**).
- **Leyhr, J.**, Haitina, T., Dearden, R., Johanson, Z., Debiais-Thibaud, M., Tafforeau, P., Dollman, K., Marcellini, S., Boisvert, C., Clarac, F., Qu, Q., Bijl, S., Stundl, J., Soukup, V., Robertson, B., Grillner, S., Wallén-Mackenzie, Å., Smith, MM., Brazeau, M., Sanchez, S. A 3D Histological Survey of Vertebrate Jaw Cartilage with Implications for Chondrichthyan Skeletal Evolution. Oral presentation delivered at the *16th International Symposium on Early and Lower Vertebrates* (Valencia, Spain - June **2022**), and *6th International Symposium on Palaeohistology* (March **2022**).
- **Leyhr, J.**, Leurs, N., Debiais-Thibaud, M., Haitina, T. Functional divergence of a novel conserved cis-regulatory element of Mohawk homeobox transcription factor during evolution of vertebrates.

Poster presentation delivered at the *8th Meeting of the European Society for Evolutionary Developmental Biology* (Naples, Italy – June **2022**).

- **Leyhr, J.**, Haitina, T. Evolutionary conservation of cis-regulatory elements of craniofacial tendons and ligaments in Gnathostomes. Oral presentation delivered at the *15th International Symposium on Early and Lower Vertebrates* (Quijing, China - August **2019**).
- Haitina, T., Waldmann, L., **Leyhr, J.** Identification of the evolutionary conserved regulatory element controlling the primary jaw joint formation in zebrafish. Poster presentation delivered at the *2nd Joint Congress on Evolutionary Biology* (Montpellier, France - August **2018**)
- **Leyhr, J.**, Waldmann, L., Haitina, T. Using tissue-specific cell ablation to study the regeneration of the zebrafish jaw joint. Poster presentation delivered at the *7th Meeting of the European Society for Evolutionary Development Biology* (Galway, Ireland - June **2018**)

Grants and Awards

Yokogawa Spinning Disk Imaging Contest **2023**
1st place award in the microscopy image competition run by the Yokogawa Corporation of America at the MBL Embryology Course – 100 USD

Society for Developmental Biology Trainee Travel Assistance Grant **2023**
Awarded for travel to attend the 82nd Annual Meeting of the Society for Developmental Biology (Chicago, USA) – 500 USD

Swedish Developmental Biology Organisation Travel Grant **2023**
Awarded for travel to attend the "Embryology: Concepts and Techniques in Modern Developmental Biology" advanced research training course at the Marine Biological Laboratory (Woods Hole, USA) – 5,000 SEK

European Synchrotron Radiation Facility Beamtime **2021**
Award LS-3021 (highlighted proposal) – "*Evolution of the shark skeleton*". Co-proposed with Dr. Sophie Sanchez, Dr. Tatjana Haitina, Dr. Zerina Johanson, Dr. Moya Meredith-Smith, Dr. Richard Dearden, Dr. Melanie Debiais-Thibaud, Dr. Sylvain Marcellini, and Dr. Qingming Qu – 33,000 USD (equivalent)

Helge Ax:son Johnsons Foundation Grant **2021**
"RNA sequencing analysis of the developing zebrafish pectoral fin" – 40,000 SEK

Anna Maria Lundin Foundation Travel Grant **2020**
Awarded for travel and accommodation to present at the 8th European Society for Evolutionary Developmental Biology conference (Naples, Italy) – 12,232 SEK

Supervision

Graduate rotation students – Joshua Kwan and Haleigh Wooters. Supervised their rotations in the Sherwood Lab, basic nematode techniques and projects. **2024/5**

Master's student – Elsa Leflaëc – *Diversity of the cartilage of vertebrates. A study of the Meckel's cartilage in chondrichthyans and osteichthyans, Master's Thesis Project* **2023**

Master's students - Paul Ideaser and Antoine Corne - *The evolution of jaw cartilage in gnathostomes*, Origin and Evolution of Vertebrates, *Master's Research Project* **2022**

Bachelor's student - Branco Vanhaverbeke - *A potential nkx3.2 enhancer in zebrafish: deletion characterization and motif expression analysis*, *Bachelor's Research Project* **2020**

Teaching

Uppsala University (Master's level courses)

Teacher, *Evolution and Development* (1BG397) **2017 - 2023**

- *Lectured on zebrafish as a model organism and skeletal development, instructed laboratory classes on transgenic animals, CRISPR functional assays, and skeletal staining, led discussion seminars, prepared exams.*

Teacher, *Developmental Biology including the Development of the Nervous System* (1BG510) **2017 – 2023**

- *Lectured on zebrafish as a model organism and early embryonic development, instructed laboratory classes on transgenic animals, morpholino and CRISPR functional assays, prepared and graded exams.*

Teacher, *Functional Genomics* (1BG322) **2020 - 2021**

- *Instructed laboratory classes in microbial metabarcoding projects, from sediment sample collection through library preparation, sequencing, and bioinformatic abundance analysis.*

Teacher, *Toxicology* (1BG209) **2019**

- *Instructed laboratory classes in basic toxicological techniques.*

Select Courses

MBL Embryology: Concepts and Techniques in Modern Developmental Biology	**2023**
EMBO Practical Course 3D Developmental Imaging	**2022**
Digital Image Analysis for Scientific Applications – focus MAX IV	**2022**
Academic Teacher Training Course (Uppsala University)	**2022**
Laboratory Animal Science for Researchers - Zebrafish	**2020**

Technical Skills

- Synteny and genomic conservation analysis
- Molecular cloning and transgenesis
- CRISPR/Cas9 genome editing
- Confocal microscopy
- Synchrotron X-ray scanning
- 3D segmentation (VGStudio MAX)
- Image analysis (ImageJ, Python)
- Data analysis (R: Shiny, Markdown; Python)
- Figure making (Adobe Illustrator)
- Document formatting (LaTeX)
- Version control (GitHub)
- CAD and 3D printing

Outreach

Coding with Ozobots at the Durham County Library	**2025**
Judge for the North Carolina State Science Fair finals	**2025**
Darwin Day – Swedish Museum of Natural History	**2020**

Referees

Dr. Tatjana Haitina
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