

MARC J. CHAMPIGNY, Ph.D.

Founder & Principal Data Scientist, PhenoLogic Co.

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ABOUT PHENOLOGIC

PhenoLogic Co. is a data science studio applying deep learning, computer vision, and statistical analyses to two distinct domains: computational plant biology and figure skating performance analytics. Founded and led by Dr. Marc Champigny, PhenoLogic pairs over 25 years of peer-reviewed research in genomics and plant molecular biology with hands-on machine learning engineering - turning complex biological and movement data into models that are accurate, interpretable, and usable by non-specialists.

WHAT WE DO

Computational Plant Biology & AI

- GWADL (Genome-Wide Association-enriched Deep Learning): A deep learning framework, developed with Agriculture and Agri-Food Canada, fusing GWAS priors with neural network architectures to reveal genotype-phenotype networks underlying poplar bioenergy and wood-quality traits.
- Epigenomic & Multi-Omics Trait Prediction: Deep learning models linking natural DNA methylation variation to *Populus balsamifera* traits (Plant Biotech J), extended to multi-omics, multi-environment, multi-trait prediction pipelines.
- Reference Genome Assembly for *Populus tremuloides*: Integrating long-read sequencing technologies, transcriptomics, and population-level genetic analyses to characterize clonal structure and adaptive variations across regional ranges.
- Genomic Variation & Climate Adaptation in *Quercus macrocarpa*: Mapping genome-wide variation in wild bur oak populations. Utilizing de novo genome assemblies, GWAS of adaptive leaf morphology and phenology traits, and gene-environment interactions to calculate genomic offset metrics and identify climate-resilient seed sources.

Sports Analytics & Computer Vision - Figure Skating

- AI-Assisted Protocol Scraper & Database: Using LLMs to scrape, structure, and standardize historical scoring data from unstructured PDF competition scorecards (10,000+ protocols).
- Behavioral Analyses of Judging & Technical Panels: Largest empirical study conducted on judging panel behavior, decomposing nationalistic bias, leniency offsets, strategic substitution, and compatriot premiums.
- SkateNet / TCS Component Score Models: Proprietary machine learning models of Total Component Score based exclusively on technical element execution, proving component collapsibility and corridor effects.
- Kinematic Telemetry & 3D Pose Extraction: Deep-learning broadcast video pipelines extracting 3D kinematic metrics (jump height, distance, launch clearance, rotational velocity, and ice homography) without wearables.

PROFESSIONAL EXPERIENCE

Founder & Principal Data Scientist | PhenoLogic Co.

2018 - Present

- Applied deep learning, computer vision, and statistical genetics consulting. (See details above)

Research Associate | University of Guelph - Food from Thought / POPCAN

2013 - 2018

- Led molecular, bioinformatic, and machine learning strategy for POPCAN, modeling natural epigenetic variation in poplar traits.
- Applied deep learning to predict climate change impacts on crop yields. Designed curriculum for and taught statistical genetics.

PROFESSIONAL EXPERIENCE (CONTINUED)

Research Associate | McMaster University, Department of Biology

2010 - 2013

- Studied adaptations of *Eutrema*, a native Canadian extremophile plant, conducting first gene-expression analyses in natural environments.
- Identified candidate genes for stress tolerance; developed methods comparing lab experiments with field data.

Postdoctoral Fellow | McMaster University & Plant Biotechnology Institute, PBI-NRC

2005 - 2009

- Studied molecular genetics and genomics of systemic disease resistance in *Arabidopsis*; demonstrated DIR1 is a long-distance mobile signal required for Systemic Acquired Resistance (SAR).

EDUCATION

- Ph.D., Biology - McMaster University, Hamilton, Canada (2005)
- M.Sc., Biology - McGill University, Montreal, Canada (1998)
- B.Sc., Biology - McGill University, Montreal, Canada (1996)

SELECTED PUBLICATIONS

- Champigny, M.J. Easy Markers, Tough Graders and True Patriots: Decomposing generosity, nationalistic bias, and gamesmanship in scoring elite figure skating. 2026.
- Zacharias, M., Porth, I., Champigny M.J., Williams, M., Koh, K., Normandeau, E., Galgamuwe, P., Isabel, N., Soolonayakanahally, R. How genomic variation shapes adaptive traits and predicts future maladaptation in *Quercus macrocarpa*. (in preparation for PNAS).
- Champigny, M.J. et al. TPS5 and TOR signaling components are determinants of *Populus balsamifera* leaf morphology. *Frontiers in Plant Science*, 2025.
- Champigny, M.J., Unda, F., Guy, R., Soolanayakanahally, R., Mansfield, S. Genome-Wide Association-enriched Deep Learning (GWADL) reveals network genotype-phenotype associations for poplar bioenergy and wood-quality traits. In preparation, *PLOS Genetics*.
- Champigny, M.J. et al. Learning from methylomes: Epigenomic correlates of *Populus balsamifera* traits based on deep learning models of natural DNA methylation. *Plant Biotechnology Journal*, 2019.
- Brautigam, K., Soolanayakanahally, R., Champigny, M.J. et al. Sexual epigenetics: gender-specific methylation of a gene in the sex determining region of *Populus balsamifera*. *Scientific Reports*, 2017.
- Champigny, M.J., Catana, V. et al. RNA-Seq effectively monitors gene expression in *Eutrema salsugineum* plants growing in an extreme natural habitat and in controlled environment conditions. *BMC Genomics*, 2013.
- Champigny, M.J., Melas, M. et al. Long-distance movement of DIR1 and the role of DIR1-like during Systemic Acquired Resistance in *Arabidopsis*. *Frontiers in Plant Science*, 2013.
- Champigny, M.J., Shearer, H. et al. Localization of DIR1 at the tissue, cellular and subcellular levels during systemic acquired resistance in *Arabidopsis*. *BMC Plant Biology*, 2011.
- Champigny, M.J. and Cameron, R.K. Action at a distance: long-distance signals in induced defense. *Advances in Botanical Research*, 2009.

[Full peer-reviewed publication list \(20+ papers\) available on request.](#)

RECOGNITION & TEACHING

- NSERC Research Tools and Instruments grant, co-author (2011); NSERC Visiting Fellowship, FRSQ-FCAR Doctoral Fellowship, Ontario Heart and Stroke Fellowship.
- Taught statistical genetics, genomics, and machine intelligence at the university and industry level, including as Machine Intelligence Mentor at Thinkful Inc. (2018-2019) and Instructor of Evolutionary Genetics and Genomics at University of Toronto Scarborough (2015-2016).