

Levi Yant

Department of Cell and Developmental Biology, John Innes Centre

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RESEARCH

- 2015-present **John Innes Centre. Tenure-Track Project leader.** My lab works broadly on the evolutionary genomics of adaptation. We focus on the mechanistic basis and evolutionary repeatability of adaptation in polyploids as well as adaptive responses to severe environmental stressors.
- 2013-2015 **Harvard University. Group leader.** We study adaptation to the challenges resulting from whole genome duplication.
- 2010-2013 **Harvard University. NIH NRSA Postdoctoral Fellow.** Molecular basis of 3D shape generation: the basis of specific plant-pollinator interactions and the key innovation of the *Aquilegia* adaptive radiation
- 2006-2010 **Max Planck Institute for Developmental Biology. Ph.D. Student** (D. Weigel and M. Schmid, advisors). Thesis: "The complex flowering time network in *Arabidopsis*: genome-wide transcription factor target repertoires." I concentrated on early development of plant ChIP-seq to characterize the roles of targeted members of the flowering time network in *Arabidopsis thaliana*, especially floral repressors.
- 2004-2006 **University of Wisconsin-Madison. Graduate Student**, Pathology (Viral Evolution). Thesis: "MHC class I-mediated protection against pathogenic AIDS viruses"
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EDUCATION

- 2006-2010 **Ph.D. (*magna cum laude*)**, Developmental Genetics, Max Planck Institute for Developmental Biology and Eberhard Karls University, Tübingen, Germany
- 2004-2006 **Master of Science**, Cellular and Molecular Pathology, University of Wisconsin-Madison
- 1996-1999 **Master of Arts**, Philosophy, University of Toronto, Ontario, Canada
- 1992-1996 **Bachelor of Arts (*magna cum laude*)**, Comparative Literature & Classics, Beloit College, Wisconsin
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AWARDED FUNDING

- 2017 JIC Institute Development Grant £21,400 Why do plants grow where they do: A key role for Two Pore Channels?
- 2016 JIC Institute Development Grant £28,509 Genome-enablement of *Cochlearia*, an outstanding genome duplication and edaphic adaptation model in the Brassicaceae
- 2016-2021 European Research Council: £1,827,797.69 Starting Grant: Genomic hotspots of adaptation to whole genome duplication.
- 2015 Norwich Research Park Science Links: £14,577 Reference genomes for the polyploid *Corydoras* catfish system to investigate the evolutionary impacts of polyploidisation
- 2014-2016 National Science Foundation: \$300,000 EAGER: Comparative Genomics of the Apple Tribe
- 2011-2014 National Institutes of Health: \$142,000 NIGMS Ruth L. Kirschstein National Research Service Award
- 2012 Harvard University: \$1,000 Postdoctoral award
- 2011 Harvard University (Arnold Arboretum): \$11,300 Putnam award
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PUBLICATIONS

36. Busoms S, Paajanen P, Marburger S, Bray S, Huang X, Poschenrieder C, **Yant L**, and Salt D. (*ready to submit*) Ecological and population genomics reveals fluctuating selection on migrant adaptive sodium transporter alleles in coastal *Arabidopsis thaliana* (**co-corresponding author** with D Salt)

35. Monnahan P, Kolář F, Baduel P, Sailer C, Koch J, Horvath R, Laenen B, Schmickl R, Paajanen P, Fuxová G, Holcová M, Arnold B, Weismann C, Marhold K, Slotte T, Bomblies K and **Yant L**. (*ready to submit*) Pervasive population genomic consequences of genome duplication in *Arabidopsis arenosa*. (**corresponding author**)
34. Collani S, Neumann M, **Yant L**, Schmid M. (*in review*) Effects of FLOWERING LOCUS T on FD during the transition to flowering at the shoot apical meristem of *Arabidopsis thaliana*.
33. Schmickl R, Marburger S, Bray S, **Yant L** (2017) Hybrids and horizontal transfer: introgression allows adaptive allele discovery. *Journal of Experimental Botany*. <https://doi.org/10.1093/jxb/erx297> (**corresponding author**)
32. **Yant L** and Bomblies K. (2017) Genomic studies of adaptive evolution in outcrossing *Arabidopsis* species. *Current Opinion in Plant Biology*. <http://dx.doi.org/10.1016/j.pbi.2016.11.018> ((**co-corresponding author** with K Bomblies)
31. Arnold B, DaCosta J, Lahner B, Weisman C, Hollister JD, Salt DE, Bomblies K, **Yant L**. (2016) Borrowed genes and convergence: serpentine adaptation in the face of inter- and intraspecific gene flow. *PNAS*. doi: 10.1073/pnas.1600405113. (**corresponding author**)
30. Pose D and **Yant L** (2016) CHIP-seq in plants. *Plant Signal Transduction, Methods Mol Biol*. 1363:25-35. http://dx.doi.org/10.1007/978-1-4939-3115-6_3.
29. **Yant L** and Bomblies K (2015) Genome management and mismanagement – cell-level problems and opportunities of whole genome duplication. *Genes and Development*, 29 (23), 2405-2419.
28. Bomblies K, Higgins J, **Yant L**. (2015) Meiosis Evolves: Adaptation to external and internal environments. Tansley Review, *New Phytologist* 208, 306. doi: 10.1111/nph.13499.
27. **Yant L** (2015) When two is a crowd: mitochondrial genome merger and its aftermath. *New Phytologist* 206, 8 doi: 10.1111/nph.13321
26. **Yant L**, Collani S, Puzey J, Levy C, EM Kramer (2015) Molecular basis for three-dimensional elaboration of the *Aquilegia* petal spur. *Proc. Roy. Soc. B* 282 20142778; DOI: 10.1098/rspb.2014.2778.
25. Sharma B, **Yant L**, Hodges S, Kramer E (2014) Understanding the development and evolution of novel floral form in *Aquilegia*. *Current Opinion in Plant Biology* 17, 22.
24. **Yant L**, Hollister JD, Wright K, Arnold BJ, Higgins JD, Franklin FCH, Bomblies K (2013) Meiotic adaptation to a genome doubled state in *Arabidopsis arenosa*. *Current Biology* 23, 2151.
(An Editors' Pick in *Science* and featured in a Dispatch in same issue of *Current Biology*)
23. Posé D, Verhage L, Ott F, **Yant L**, Mathieu J, Angenent GC, Immink RGH, Schmid M (2013) Temperature-dependent regulation of flowering by antagonistic FLM variants. *Nature* 503, 414.
(Featured in a Perspective in *Science*)
22. Dinh TT, Girke T, Liu X, **Yant L**, Schmid M, Chen X (2012) The floral homeotic protein APETALA2 recognizes and acts through an AT-rich sequence element. *Development* 139, 1978.
21. **Yant L** (2012) Genome-wide mapping of transcription factor binding reveals developmental process integration and a fresh look at evolutionary dynamics. *American Journal of Botany* 99, 277.
20. Salomé PA, Bomblies K, Fitz J, Laitinen R, Warthmann N, **Yant L**, Weigel D (2011) The recombination landscape in *Arabidopsis thaliana* F₂ populations. *Heredity* 108, 447.
19. Pose D*, **Yant L***, Schmid M (2011) The end of innocence: flowering networks explode in complexity. *Current Opinion in Plant Biology* 15, 45. *equal contribution

18. Moyroud E, Gomez-Minguet E, Ott F, **Yant L**, Pose-Padilla D, Blanchet S, Monniaux M, Bastien O, Thévenon E, Weigel D, Schmid M, Parcy F (2011) Prediction of regulatory interactions from genome sequences using a biophysical model for the Arabidopsis LEAFY transcription factor. *Plant Cell* 23, 1293. (April 2011 Cover)
17. Salomé PA, Bomblies K, Laitinen R, **Yant L**, Mott R, Weigel D (2011) Genetic architecture of flowering time variation in *Arabidopsis thaliana*. *Genetics* 188, 421. (June 2011 Cover)
16. **Yant L**, Mathieu J, Dinh TT, Ott F, Wollman H, Chen X, Schmid M (2010) Orchestration of the floral transition and floral development by the bifunctional transcription factor APETALA2. *Plant Cell* 22, 2156. (Faculty of 1000 rated)
15. Bomblies K, **Yant L**, Laitinen R, Kim, ST, Weigel D (2010) Local-scale patterns of genetic variability, outcrossing, and spatial structure in natural stands of *Arabidopsis thaliana*. *PLoS Genetics* 6, e1000890.
14. **Yant L**, Mathieu J, Schmid M (2009) Just say “no”: floral repressors help *Arabidopsis* bide the time. *Current Opinion in Plant Biology* 12, 580.
13. Mathieu J, **Yant LJ**, Mürdter F, Küttner F, Schmid M (2009) Repression of flowering by the miR172 target SMZ. *PLoS Biology* 7, e1000148.
12. Maness NJ, **Yant LJ**, Chung C, Friedrich TC, Piaskowski SM, Furlott J, May GE, Soma T, Leon EJ, Wilson NA, Piontkivska H, Hughes AL, Sidney J, Sette A, Watkins DI (2008) Comprehensive immunological evaluation of elite controller and progressor, Mamu-B*17-positive SIV-infected rhesus macaques reveals surprisingly few differences. *Journal of Virology* 82, 5245.
11. Friedrich TC, Valentine LE, **Yant LJ**, Rakasz EG, Piaskowski SM, Furlott JR, Weisgrau KL, Burwitz B, May GE, León EJ, Soma T, Napoe G, Capuano III SV, Wilson N, Watkins DI (2007) Subdominant CD8+ T-cell responses are involved in durable control of AIDS virus replication. *Journal of Virology* 81, 3465.
10. Wojcechowskyj JA, **Yant LJ**, Wiseman RW, O'Connor DH (2007) Control of SIVmac239 is not predicted by inheritance of *Mamu-B*17*-containing haplotypes. *Journal of Virology* 81, 406.
9. Wilson NA, Reed J, Napoe GS, Piaskowski S, Szymanski A, Furlott J, Gonzalez EJ, **Yant LJ**, Maness NJ, May GE, Soma T, Reynolds MR, Rakasz E, Rudersdorf R, McDermott AB, O'Connor DH, Friedrich TC, Allison DB, Patki A, Picker LJ, Burton DR, Lin J, Huang L, Patel D, Heindecker G, Fan J, Citron M, Horton M, Wang F, Liang X, Shiver JW, Casimiro DR, Watkins DI (2006) Vaccine-induced cellular immune responses reduce plasma viral concentrations after repeated low-dose challenge with pathogenic simian immunodeficiency virus SIVmac239. *Journal of Virology* 80, 5875.
8. **Yant LJ**, Friedrich TC, Johnson RC, May G, Maness NJ, Enz AM, Lifson J, O'Connor DH, Carrington M, Watkins DI (2006) The high frequency MHC class I allele *Mamu-B*17* is associated with control of SIVmac239 replication. *Journal of Virology* 80, 5074.
7. Loffredo JT, Rakasz EG, Giraldo JP, Spencer SP, Grafton KK, Martin SR, Napoe G, **Yant LJ**, Wilson NA, Watkins DI (2005) Tat(28-35)SL8-specific CD8+ T lymphocytes are more effective than Gag(181-189)CM9-specific CD8+ T lymphocytes at suppressing simian immunodeficiency virus replication in a functional in vitro assay. *Journal of Virology* 79, 14986.
6. O'Connor DH, McDermott AB, Krebs KC, Dodds EJ, Miller JE, Gonzalez EJ, Jacoby TJ, **Yant LJ**, Piontkivska H, Pantophlet R, Burton DR, Rehauer WM, Wilson N, Hughes AL, Watkins DI (2004) A dominant role for CD8+-T-lymphocyte selection in simian immunodeficiency virus sequence variation. *Journal of Virology* 78, 14012.
5. Friedrich TC, McDermott AB, Reynolds MR, Piaskowski S, Fuenger S, de Souza IP, Rudersdorf R, Cullen C, **Yant LJ**, Vojnov L, Stephany J, Martin S, O'Connor DH, Wilson N, Watkins DI (2004) Consequences of cytotoxic T-lymphocyte escape: common escape mutations in simian immunodeficiency virus are poorly recognized in naive hosts. *Journal of Virology* 78, 10064.
4. McDermott AB, Mitchen J, Piaskowski S, De Souza I, **Yant LJ**, Stephany J, Furlott J, Watkins DI (2004) Repeated low dose mucosal SIVmac239 challenge results in the same viral and immunological kinetics as high dose challenge; a model for the evaluation of vaccine efficacy in non-human primates. *Journal of Virology* 78, 3140.

3. Friedrich TC, Dodds E, **Yant LJ**, Rudersdorf R, Cullen C, Evans ET, Desrosiers RC, Mothé BR, Sidney J, Sette A, Kunstman K, Wolinsky S, Piatak M, Lifson J, Wilson N, O'Connor DH, Watkins DI (2004) Reversion of cytotoxic T-lymphocyte (CTL) escape variant immunodeficiency viruses *in vivo*. *Nature Medicine* 10, 275.
2. Friedrich TC, Frye CA, **Yant LJ**, O'Connor DH, Kriewaldt N, Benson M, Dodds EJ, Cullen C, Rudersdorf R, Hughes AL, Wilson N, Watkins DI (2004) Extra-epitopic compensatory substitutions restore fitness to simian immunodeficiency virus variants that escape from an immunodominant cytotoxic T-lymphocyte response. *Journal of Virology* 78, 2581.
1. **Yant LJ**, Ran Q, Rao L, Van Remmen H, Shibatani T, Belter JG, Motta L, Richardson A, Prolla TA (2003) The selenoprotein GPX4 is essential for mouse development and protects from radiation and oxidative damage insults. *Free Radical Biology and Medicine* 34, 496.

INVITED SEMINARS

- 2018 **Oxford University** Plant Sciences Departmental Seminar, Oxford, UK (*upcoming: May 24*)
- 2018 **Max Plank Institute MPIPZ** Wednesday Open Seminar, and *Arabidopsis* meeting closing seminar, Cologne, Germany (Feb 7)
- 2018 **University of Arizona**, Tucson Plant Sciences Department seminar Tucson, AZ, USA (Jan 16)
- 2018 **Plant and Animal Genome (PAG)** 2018 Cytogenetics session, San Diego, CA, USA (Jan 14)
- 2018 **Popgroup 51** Bristol, UK (Jan 4)
- 2017 **Opening Lecture for Masters in Plant Biology, Genomics and Biotechnology Program** Universidad Autónoma de Barcelona, Spain (October 10)
- 2017 **21st Evolutionary Biology Meeting at Marseilles (EBM21)** Marseilles France (September 26)
- 2017 **28th International Conference on Arabidopsis Research** St. Louis Missouri, USA (June 22)
- 2017 **University of Stirling** Department of Biology seminar, Stirling, UK (April 3)
- 2017 **Postdoc Retreat Career Day Speaker** Norwich, UK (February 26)
- 2017 **University of Nottingham** Division of Plant and Crop Sciences seminar, Nottingham, UK (January 18)
- 2016 **Cambridge University** GARNet NatVar 2016 Meeting, Cambridge UK (December 13)
- 2016 **Science Away Day Norwich Research Park**, Norwich UK (December 9)
- 2016 **Prague Charles University** Institute of Botany, Academy of Sciences, Prague CZ (December 6)
- 2016 **GRO ISP Seminar, John Innes Centre** Norwich UK (September 19)
- 2016 **Society for Experimental Biology** Annual Meeting (Session Chair and Speaker), Brighton UK (July 4)
- 2016 **University of East Anglia** Centre for Ecology, Evolution and Conservation, Norwich, UK (June 29)
- 2016 **International Conference on Polyploidy, Hybridization and Biodiversity** Rovinj, Croatia (May 12)
- 2016 **University of East Anglia** Centre for Ecology, Evolution and Conservation, Norwich, UK (April 12)
- 2016 **Cambridge University** Evolutionary Genetics and Genomics Symposium, Cambridge, UK (March 15)
- 2016 **University of East Anglia** CEEC Rebellion (Plenary speaker), Norwich, UK (March 14)
- 2016 **ELSA Adaptation meeting** Norwich, UK (February 25)
- 2015 **Molecular Basis of Plant Evolutionary Innovations Symposium** Cologne, Germany (November 9)
- 2015 **Plant Genome Evolution** Amsterdam, Netherlands (September 9)
- 2015 **26th International Conference on Arabidopsis Research** Paris, France (July 8)
- 2015 **University of Vienna, Department for Botany and Biodiversity Research** Vienna, Austria (April 8)
- 2014 **John Innes Centre** Norwich, UK (December 16)
- 2014 **Langebio National Laboratory of Genomics for Biodiversity** Mexico (December 9)
- 2014 **Harvard University** Herbarium Seminar, Cambridge MA (November 2)
- 2014 **Plant and Animal Genome XXII Conference** San Diego, C.A, (January 12)
- 2013 **Cornell University** Plant Biology Seminar, Ithaca NY (December 6)
- 2013 **Harvard University** Museum of Comparative Zoology Seminar, Cambridge MA (December 2)
- 2012 **University of Massachusetts** Amherst, Department of Biology, Amherst MA (December 18)
- 2012 **Wood's Hole** Society for Developmental Biology, Wood's Hole CT (April 14)
- 2011 **Cold Spring Harbor Laboratory** NY (August 30)
- 2010 **Whitehead Institute** Plants in New England Seminar, Cambridge MA (December 1)
- 2010 **Harvard University** Herbarium Seminar, Cambridge MA (September 21)

HONORS AND AWARDS

- 2012 **Harvard University** Postdoctoral Award for Professional Development (university-wide, competitive award)
- 2011-2014 **National Institutes of Health, National Research Service Award** for Individual Postdoctoral Fellows
- 2011-2012 **Putnam Fellowship**, Arnold Arboretum of Harvard University

2010	<i>Dr. rerum naturum: magna cum laude</i> (PhD)
2006	Keystone Symposium Travel Grant
2004-2005	Award for top graduate student (Dept. of Pathology, University of Wisconsin)
1996	Master of Arts (<i>magna cum laude</i>)
1992-1995	Dean's List (Beloit College)
1996-1998	Full Graduate Fellowship (University of Toronto)
1995	Horace White Prize for top undergraduate in major field (Beloit College)
1992-1995	Merit Fellowships (Beloit College)
1993	PEW Summer Science Fellowship (University of Chicago)

TEACHING AND MENTORING

2014-2015	Developed a new course in the Molecules, Cells, and Organisms graduate program (Harvard University), "Next Generation Sequencing 101: Massively parallel RNA and DNA sequencing". This course covered <i>de novo</i> genome assembly, resequencing and scanning for signatures of selection in non-model systems.
2013-2015	International Masters Program Mentor (Harvard University, MEME) -Genomics laboratory mentoring of two graduate students, focusing on obtaining genomic information in non-model systems by a variety of next generation approaches
2011-2014	Senior Honors Thesis Co-mentor (Harvard University) -Investigated the effects of climate change on developmental timing in diverse wild plant species and initiated development of several as potential model laboratory systems -Performed genome-wide transcriptional profiling of a temperature tracking species, along with phenological profiling of species' responses to climate change
2011-2015	High School Student Mentor (Cambridge Rindge & Latin School and Harvard University) -Involved high school and Harvard students in bioinformatic analyses of genome-scale variation -Exposed students to the diversity of bioscience possibilities in bioinformatics and wet lab research
2011-2012	Head Teaching Fellow , Organismic and Evolutionary Biology 57: Animal Behavior (Harvard University) -Developed curricula, coordinated, and taught sections of a class of 146 students -Coordinated and oversaw the efforts of 7 graduate teaching fellows -Awarded excellent reviews by students (4.5/5.0)

Advising - Postdoctoral Scholars, Graduate students and Research Associates

2017-	Mark Alston (JIC Postdoc)
2016-	Mellieha Allen (UEA undergraduate)
2016-	Anita Bollman (JIC PhD student)
2016-	Pirita Paajanen (JIC Postdoc)
2016-	Guilia Chiappa (JIC RA)
2016-	Sian Bray (JIC Postdoc)
2016-	Silvia Busoms (JIC Postdoc)
2016-2017	Jordan Koch (JIC RA)
2016-2017	Patrick Monnahan (JIC Postdoc; now Postdoc, University of Minnesota, Brandvain lab)
2016-2017	Laura Hebberecht (JIC RA; now Graduate Student Cambridge University, Jiggins lab)
2015-2017	Sarah Marburger (JIC Postdoc)
2015-	Christian Sailer (Harvard and JIC Postdoc)
2014-2016	Jeffery DeCosta (Harvard Postdoc; now Assistant Professor, Boston College)

Advising – Graduate students

2017-	Sigfried Leher (JIC/UEA. Primary supervisor is Dale Sanders.)
2016-	Mabon Elis (JIC/UEA; secondary supervisor. Primary supervisor is Enrico Coen.)

Advising - Undergraduate honors thesis students

2014-2015	John Pulice (Harvard)
2012-2013	Courtland Kelly (Harvard)
2011-2012	Kimberly O'Donnell (Harvard)

Advising - High School students (resulted in first author publication for student)

2011-2012	Imtiyaz Hossain (Harvard)
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COMMUNITY

- 2017 Organized "The Molecular Mechanisms of Adaptation" Earth and Life Systems Alliance Workshop (ELSA) (7th April) at The University of East Anglia, Norwich U.K.
- 2016 Organized "Adaptation and Genome Dynamics across Species and Kingdoms" ELSA Workshop (25th February) at The John Innes Centre, Norwich U.K.
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ACTIVE COLLABORATIONS

David Salt, University of Nottingham, U.K.
Mario Vallejo-Marin, University of Stirling, Scotland, U.K.
Yves Van de Peer, Ghent, Belgium
Simon Martin, Cambridge University, Cambridge, U.K.
Rose Kigathi, Pwani University, Kilifi, Kenya
Markus Koch, University of Heidelberg, Germany
Kirsten Bomblies, John Innes Centre, Norwich, U.K.
James Higgins, University of Leicester, U.K.
Filip Kolar, Charles University, Prague C.Z.
Roswitha Schmickl, Charles University, Prague C.Z.
Karol Marhold, Charles University, Prague C.Z.
Ute Kramer, Ruhr-Universität Bochum, Germany
Magnus Nordborg, GMI, Vienna, Austria
Detlef Weigel, Max Planck, Tübingen, Germany

SERVICE (EXTERNAL)

- PhD Thesis committee: University of Aberdeen and Universitat Autònoma de Barcelona (Silvia Busoms)
- Proposal review: BBSRC, The Royal Society, NERC, National Science Foundation, FWF Austrian Science Fund, BARD Israeli-American Competitive Grants, Israeli Science Foundation (ISF) Grants
- Manuscript review: *PNAS, Nature Communications, PLOS Genetics, Nucleic Acids Research, Molecular Biology and Evolution, The Plant Cell, Genome Biology and Evolution, Heredity, Molecular Ecology, BMC Genomics, New Phytologist, Current Opinion in Plant Biology, Plant and Cell Physiology, American Journal of Botany, Frontiers in Plant Evolution and Development, Molecular Plant, Scientific Reports.*
- External review: BBSRC, University of Lyon (<http://biologie.ens-lyon.fr/masterbiosciences>)
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PATENT

"Improved HIV Vaccine Designed to Induce Broad Immune Response Against Subdominant Antigens" A novel approach to broaden and strengthen cellular immune responses for a global AIDS vaccine. Serial number P06251 12/022530

REFERENCES

Professor Elena Kramer (Postdoctoral Advisor)
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Harvard University
Cambridge, Massachusetts, USA
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Professor Markus Schmid (Ph.D. Thesis Advisor)
Umeå University
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Professor Richard Morris (Faculty Mentor)
John Innes Centre
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