

David Wheeler, PhD

Education

- 2003 **PhD, Department of Molecular Life Sciences, University of Adelaide.**
"The globen genes of the Tammar wallaby"
- 1997 **B.Sc. Honours (First Class), Department of Genetics, University of Adelaide.**
- 1996 **B.Sc. (Jurisprudence), University of Adelaide.**
Majoring in Genetics and Law

Employment

- 2017–now **Bioinformatician and Managing director**, Nextgen Bioinformatic Services Ltd, NZ.
- 2013–2017 **Lecturer in Genomics and Bioinformatics**, Institute of Fundamental Sciences, Massey University, NZ (0.8 FTE).
- 2013–2017 **Bioinformatician**, New Zealand Genomics Ltd, NZ (0.2 FTE).
- 2010–2013 **Postdoctoral Fellow**, Bioinformatician, PI Prof. John Werren, Department of Biology, University of Rochester, NY, USA.
- 2008–2010 **Postdoctoral Fellow**, Bioinformatician, PI Prof. Michael Herman, Ecological Genomics Institute, Kansas State University, KS, USA.
- 2005–2007 **Postdoctoral Fellow**, Molecular biologist, PI A/Prof. Edward Newbigin, Department of Botany, University of Melbourne, AUS.
- 2002–2003 **Research Assistant**, Department of Physiology, University of Adelaide, AUS.
- 2002 **Research Assistant**, Evolutionary Biology Unit, SA State Museum, AUS.

Bioinformatics

- Mappers BWA, STAR, GEM, tophat, hisat2, bmap
- RNA-seq DESeq2, edgeR, cufflinks, ballgown, DEXseq
- SNP/WGBS GATK, freebayes, samtools, SNPeff, vcftools, bmap package
- Assembly SOAP *de novo*, velvet, oases, trinity, IDBA-UD, SPAdes, MIRA, ABySS
- Metagenomics DIAMOND/PAUDA, megan, QIIME
- Phylogenetics PAUP, Mrbayes, paml, phylip
- QC SolexQA, cut-adapt, fastq-mcf, bbduk
- Homology NCBI-BLAST tools, muscle, clustalw2
- Misc R scripting, BioPython, ggplot2, python-matplotlib, python-pandas, IGV, git, ea-utils, picard tools, Geneious, Galaxy, tmux, vim

Computer skills

- Advanced Python, bash, Linux system administration
- Proficient HTML, \LaTeX , Django web framework, PBS scripting, R
- Basic Perl, javascript, JAVA

Current activities and Research profile

- Current** I am particularly excited by the role next generation sequencing will play in helping us gain a better understanding of our natural environment by giving us access to the genomes of organisms that inhabit it. My business focuses on supplying bioinformatic services to the research community in New Zealand. I have performed service work for scientists across the health, agricultural, ecological and life sciences research disciplines. The themes of my research are ecological genomics, reproductive biology, host-parasite interactions, drug development, agricultural and engineering systems.
- Collaborative** Collaboration is also a strong aspect of my research program. As a member of international sequencing consortiums our research has been recently published in *Genome Biology*, *Current Biology*, *The ISME journal*, *Nature communications*, and the *Plant Journal*. In my previous position as a lecturer in Genomics and Bioinformatics at Massey University I developed several local active collaborations, including A/Prof Mary Morgan-Richards (Ecology) and Prof Steve Trewick (Ecology), Dr Andrea Clavijo-McCormick (Ecology), Prof Beniot Guieysse (Engineering), Dr Jan Schmid (IFS Massey), Dr Tracy Hale (IFS Massey), A/Prof Gillian Norris (IFS Massey), A/Prof Jasna Rakonjac (IFS Massey), A/Prof Janet Pitman (VUW) and Ieuan Davies (New Zealand Pharmaceuticals Ltd). I was co-supervisor to seven postgraduate students in the IFS and one Masters student at VUW. .

Awards and grants

- ongoing **Royal Society of NZ Marsden Fund**, Associate investigator, Invited to apply for second round with PI Dr Helen Fitzsimons, Institute of Fundamental Science, Massey University.
- ongoing **Royal Society of NZ Marsden Fund**, Associate investigator, Invited to apply for second round, with PI Prof Beniot Guieysse, School of Engineering and Advanced Technology, Massey University.
- 2016 **Health Research Council NZ**, Associate investigator, "Targeting HP1 regulated pathways to suppress breast cell invasion", \$199,792 NZD.
- 2016 **Massey University Research Fund**, Associate investigator, "Investigating the molecular basis of P uptake in green algae to support decentralized wastewater treatment in rural communities", \$14,000 NZD.
- 2015 **Massey University Research Fund**, Primary investigator, "Exploring the transcriptome dynamics of an intracellular bacteria and its host using RNA-seq", \$24,000 NZD.
- 1998 **Australia Postgraduate Award**, Postgraduate Scholarship awarded based on merit by the Australian Government.
- 1997 **Boehringer-mannheim prize**, Prize awarded to the highest placed student in Honours Genetics, University of Adelaide.

Postgraduate Supervision

- Primary** **Ngonidzashe Faya**, Studying the molecular interactions between *Nasonia vitripennis* and its associated microbes using RNA-seq.
- Co-supervisor** **Asad Razaq, Yanni Dong, Patrick Main, Sean Bisset, Lydia Swapna, Van Hung Vuong Le, Raveen Weerasinghe (Masters student), Natasha Quill (Masters student).**

Teaching

- Philosophy** My teaching philosophy is motivated by a belief that our students should be playing key roles in the ecological, agricultural and medical revolution that will be driven by cheap sequencing. As genome sequencing becomes an essential tool across many scientific disciplines, young graduates with skills to process and interpret this non-traditional data will be in high demand both within and outside academia. Our students will also be playing central roles in the development of government policy, working to protect our environment and creating new smart industries.

- Postgraduate **Research methods in Biosciences**, "Developing a research proposal".
Special topic - Python programming for bioinformatics, Hands on training course for post-graduate students in the use of python for bioinformatics.
- Undergraduate **Genome analysis (Paper coordinator; 3rd year)**, Course that covers basic bioinformatics methods used for analysing next generation sequencing data.
DNA Technology (3rd year), Lectures on high throughput sequencing methods and applications.
Advanced practical genetics (3rd year), Student mentor.
Genetic Analysis (2nd year), Lectures covering the topic of Developmental genetics.

Professional activities

- Reviewer Molecular Biology and Evolution, BMC Genomics, PLoSOne, The Database Journal, Scientific Reports, Journal of Venom research, Bioinformatics, Toxins and Biology Insights.
- Grant review Ministry of Business Innovation and Employment New Zealand (phase I and II), Austrian Science Fund, Research Foundation Flanders.
- Invited talks "Introduction to Bioinformatics and Genomics tools for Ecologists", IAE, August 2017, Massey University, NZ.
 "What Python can tell us about Donald Trump's twitter habits: an overview of python libraries that help you explore the social web", Keynote talk, Research Bazaar, February 2017, Massey University, NZ.
 "Insect venoms: A new frontier in drug development?" Genetics Otago symposium 2014, November 26-29th, University of Otago, NZ.
 "Introducing *Nasonia vitripennis*". Keynote talk, NZ Entomology Society meeting 2013, April 3-5, Massey University, Palmerston North, NZ.
 "Insights from the recently completed genome of the parasitoid wasp *Nasonia vitripennis*". Plant and Soil Sciences, 2011, University of Vermont, VT, USA.

Outreach activities

Puhoro day. Developed and ran a hands on practical demonstration for 60 Maori high school students to enable them to meet NCEA level one requirements related to Achievement Standard AS90948 (Genetic Variation), 2016, IFS, Massey University.

Leader of the weekly learn to code for life scientists group, including introduction to Linux and Python programming targeted toward science students and staff, Massey University.

My Bioinformatics blog (www.dwheelerau.com) currently has 220,000 views.

Kura Putaiao Day. "The biology of wasps: murderers, thieves and body snatchers!". Lecture presented to year 12 and 13 Maori students from low decile schools, 2013-2015, Massey University.

Demonstrator in molecular biology and bioinformatics sessions, Katoa New Zealand student visit, 2014, IFS, Massey University.

Publications

Andrea Clavijo McCormick, Ewald Grosse-Wilde, David Wheeler, Mark C Mescher, Bill S Hansson, and Consuelo M De Moraes. Comparing the expression of Olfaction-Related genes in gypsy moth (*lymantria dispar*) adult females and larvae from one flightless and two Flight-Capable populations. *Frontiers in Ecology and Evolution*, 5:115, 2017. Journal IF=6.4.

Maxence Plouviez, David Wheeler, Andy Shilton, Michael A Packer, Patricia A McLenachan, Emanuel Sanz-Luque, Francisco Ocaña-Calahorra, Emilio Fernández, and Benoit Guieysse. The biosynthesis of nitrous oxide in the green alga *chlamydomonas reinhardtii*. *Plant J.*, 91(1):45–56, July 2017. Journal IF=5.901.

Andre D Sim and David Wheeler. The venom gland transcriptome of the parasitoid wasp *Nasonia vitripennis* highlights the importance of novel genes in venom function. *BMC Genomics*, 17:571, 2016. Journal IF=3.867.

Joshua B Benoit, Zach N Adelman, Klaus Reinhardt, Amanda Dolan, Monica Poelchau, Emily C Jennings, Elise M Szuter, Richard W Hagan, Hemant Gujar, Jayendra Nath Shukla, and Others. Unique features of a global human ectoparasite identified through sequencing of the bed bug genome. *Nat. Commun.*, 7, 2016. Journal IF=11.329.

Antonia Klein, Lukas Schrader, Rosario Gil, Alejandro Manzano-Marín, Laura Flórez, David Wheeler, John H Werren, Amparo Latorre, Jürgen Heinze, Martin Kaltenpoth, and Others. A novel intracellular mutualistic bacterium in the invasive ant *Cardiocondyla obscurior*. *ISME J.*, 10(2):376–388, 2016. Journal IF=9.438.

Chaoyang Zhao, Lucio Navarro Escalante, Hang Chen, Thiago R Benatti, Jiaxin Qu, Sanjay Chellapilla, Robert M Waterhouse, David Wheeler, Martin N Andersson, Riyue Bao, and Others. A massive expansion of effector genes underlies gall-formation in the wheat pest *Mayetiola destructor*. *Curr. Biol.*, 25(5):613–620, 2015. Journal IF=9.571.

Aisha L Siebert, David Wheeler, and John H Werren. A new approach for investigating venom function applied to venom calreticulin in a parasitoid wasp. *Toxicon*, 107:304–316, 2015. Journal IF=2.708.

Aisha L Siebert, Jeremy Wright, Ellen Martinson, David Wheeler, John H Werren, and Others. Parasitoid venom induces metabolic cascades in fly hosts. *Metabolomics*, 11(2):350–366, 2015. Journal IF=3.995.

Ellen O Martinson, David Wheeler, Jeremy Wright, Aisha L Siebert, John H Werren, and Others. *Nasonia vitripennis* venom causes targeted gene expression changes in its fly host. *Mol. Ecol.*, 23(23):5918–5930, 2014. Journal IF=6.330.

Maria S Tretiakova, Sarah D Bond, David Wheeler, Alejandro Contreras, Masha Kocherginsky, Todd G Kroll, and Tracy K Hale. Heterochromatin protein 1 expression is reduced in human thyroid malignancy. *Lab. Invest.*, 94(7):788–795, 2014. Journal IF=3.676.

Jin-Hua Xiao, Zhen Yue, Ling-Yi Jia, Xin-Hua Yang, Li-Hua Niu, Zhuo Wang, Peng Zhang, Bao-Fa Sun, Shun-Min He, Zi Li, and Others. Obligate mutualism within a host drives the extreme specialization of a fig wasp genome. *Genome Biol.*, 14(12):1–18, 2013. Journal IF=11.313.

Xu Wang, David Wheeler, Amanda Avery, Alfredo Rago, Jeong-Hyeon Choi, John K Colbourne, Andrew G Clark, and John H Werren. Function and evolution of DNA methylation in *Nasonia vitripennis*. *PLoS Genet.*, 9(10):e1003872, 2013. Journal IF=8.555.

David Wheeler, Amanda J Redding, and John H Werren. Characterization of an ancient lepidopteran lateral gene transfer. *PLoS One*, 8(3):e59262, 2013. Journal IF=3.702.

David Wheeler, Brian J Darby, Timothy C Todd, and Michael A Herman. Several grassland soil nematode species are insensitive to RNA-mediated interference. *J. Nematol.*, 44(1):92, 2012. Journal IF=1.081.

Jungsun Park, Zuogang Peng, Jia Zeng, Navin Elango, Taesung Park, David Wheeler, John H Werren, and V Yi Soojin. Comparative analyses of DNA methylation and sequence evolution using nasonia genomes. *Mol. Biol. Evol.*, 28(12):3345–3354, 2011. Journal IF=13.649.

Brian J Darby, Kenneth L Jones, David Wheeler, and Michael A Herman. Normalization and centering of array-based heterologous genome hybridization based on divergent control probes. *BMC Bioinformatics*, 12(1):183, 2011. Journal IF=2.435.

David Wheeler and Ed Newbigin. Expression of 10 s-class SLF-like genes in *Nicotiana alata* pollen and its implications for understanding the pollen factor of the S locus. *Genetics*, 177(4):2171, 2007. Journal IF=5.963.

Steven J B Cooper, David Wheeler, Alison De Leo, Jan-Fang Cheng, Robert A B Holland, Jennifer A Marshall Graves, and Rory M Hope. The mammalian α^D -globin gene lineage and a new model for the molecular evolution of α -globin gene clusters at the stem of the mammalian radiation. *Mol. Phylogenet. Evol.*, 38(2):439–448, 2006. Journal IF=4.018.

Steven J B Cooper, David Wheeler, Rory M Hope, Gaynor Dolman, Kathleen M Saint, Andrew A Gooley, and Robert A B Holland. The α -globin gene family of an australian marsupial, *Macropus eugenii*: the long evolutionary history of the θ -globin gene and its functional status in mammals. *J. Mol. Evol.*, 60(5):653–664, 2005. Journal IF=1.863.

Alison A De Leo, David Wheeler, Christophe Lefevre, J-F Cheng, R Hope, J Kuliwaba, K R Nicholas, M Westerman, and JAM Graves. Sequencing and mapping hemoglobin gene clusters in the australian model dasyurid marsupial *Sminthopsis macroura*. *Cytogenet. Genome Res.*, 108(4):333–341, 2004. Journal IF=1.764.

David Wheeler, Rory M Hope, Steven J B Cooper, Andrew A Gooley, and Robert A B Holland. Linkage of the β -like ω -globin gene to α -like globin genes in an australian marsupial supports the chromosome duplication model for separation of globin gene clusters. *J. Mol. Evol.*, 58(6):642–652, 2004. Journal IF=1.945.

David Wheeler, Rory Hope, Steven J B Cooper, Gaynor Dolman, Graham C Webb, Cynthia D K Bottema, Andrew A Gooley, Morris Goodman, and Robert A B Holland. An orphaned mammalian β -globin gene of ancient evolutionary origin. *Proceedings of the National Academy of Sciences*, 98(3):1101–1106, 2001. Journal IF=9.423.

Professional References

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Relationship: Academic mentor

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Relationship: Former postdoctoral supervisor