

Oliver Griffith

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EDUCATION

PhD, University of Sydney (2012 – 2015) (conferred September 25 2015)

- Advisors: Michael B. Thompson & Katherine Belov
- Dissertation: Mechanisms of placental evolution; the genetics and physiology of pregnancy in lizards

BSc (Advanced) with Honours (First Class), University of Sydney (2008-2011)

- Advisor: Michael B. Thompson, Katherine Belov
- Dissertation: The genetic basis of placental evolution in amniotes
- Biology major

Higher School Certificate, Northern Beaches Christian School (2000-2005)

RESEARCH PROGRAM

My research uses wildlife models to address critical questions in ecology and evolution. Most notably, I aim to address how mutation and selection support the evolution of complex traits in animals such as the evolution of new organs. To achieve this, my research integrates genomics, developmental biology, ecology, and ecophysiology using terrestrial vertebrates. My current projects use genetic, genomic, and cell biology techniques to identify how complex components of pregnancy have evolved. This includes the evolution of placental nutrient transfer, maternal – fetal signalling, and the beneficial aspects of inflammation during pregnancy.

APPOINTMENTS

2018 – 2021 University of Melbourne – ARC DECRA Fellow

2015 - 2018 Yale University - Gaylord Donnelley Postdoctoral Environmental Fellow

PUBLICATIONS

21. Chavan AR, **Griffith OW**, Stadtmauer D, Maziarz J, Pavlicev M, Fishman R, Koren L, Romero R, Wagner GP (Pre Print) Evolution of embryo implantation was enabled by the origin of decidual cells in eutherian mammals. **bioRxiv**. <https://doi.org/10.1101/429571>
20. **Griffith, OW**, Vhavan, AR, Pavlicev, M, Protopapas, S, Callahan, R, Maziarz, J, Wagner, GP (In Press) Endometrial recognition of pregnancy occurs in the grey short-tailed opossum (*Monodelphis domestica*). **Proc Roy Soc B**. 286 (1905),
19. Erkenbrack, E.M., Maziarz, J.D., **Griffith, O.W.**, Liang, C., Chavan, A.R. and Wagner, G.P., (2018) The mammalian decidual cell evolved from a cellular stress response. **PLoS Biol**. <http://dx.doi.org/10.1371/journal.pbio.2005594>
18. Van Dyke, JU & **Griffith OW** (2018) Mechanisms of reproductive allocation as drivers of developmental plasticity in reptiles. **J Exp Zool Part A**. <https://doi.org/10.1002/jez.2165>
17. Wagner, GP, **Griffith, OW**, Bergmann, P, Bello-Hellegouarch, G, Kohlsdorf, T, Bhullar, A, & Siler, CD (2018) Are there general laws for digit evolution in squamates? The loss and re-evolution of digits in a clade of fossorial lizards (Brachymeles, Scincinae). **J Morph**.
16. **Griffith, OW**, Chavan, AR, Protopapas, S, Romero, R, Wagner, GP (2018) Reply to Liu: inflammation before implantation both in evolution and development. **Proc Natl Acad Sci USA**, 115 (1), E3-4. <https://doi.org/10.1073/pnas.1717001115>
15. Cornetti, L, **Griffith, OW**, Benazzo, A, Panziera, A, Whittington, CM, Thompson, MB, Vernesi, C, Bertorelle, G (2017) Candidate genes involved in the evolution of viviparity: a RAD sequencing

- experiment in the lizard *Zootoca vivipara* (Squamata: Lacertidae). **Zool J Linnean Soc.** <https://doi.org/10.1093/zoolinnea/zlx069>
14. Chavan, AR, **Griffith, OW**, & Wagner, GP (2017) The Inflammation Paradox in the Evolution of Mammalian Pregnancy: turning a foe into a friend. **Cur Opin Genet Dev**, 47, 24-32. <https://doi.org/10.1016/j.gde.2017.08.004>
 13. **Griffith, OW**, Chavan, AR, Protopapas, S, Romero, R, Wagner, GP (2017) Embryo implantation evolved from an ancestral inflammatory attachment reaction. **Proc Natl Acad Sci USA**, 114 (32), E6566-E6575. <http://dx.doi.org/10.1073/pnas.1701129114>
 12. Siler, CD, Davis, DR, Watters, JL, Freitas, ES, **Griffith, OW**, Bindaday, JW, Lobos, AHT, Armaga, AK, Brown, RM (2017) The first record of the *Pseudogecko brevipes* Complex from the northern Philippines, with description of a new species from Luzon Island. **Herpetologica**, 73 (2), 162-175.
 11. **Griffith, OW** & Wagner GP (2017) The placenta as a model for understanding the origin and evolution of vertebrate organs **Nature Ecol Evol.** 1 (4), 0072. <http://dx.doi.org/10.1038/s41559-017-0072>.
 10. **Griffith, OW**, Brandley, MC, Belov, K, & Thompson MB (2016) Reptile pregnancy is underpinned by complex changes in uterine gene expression: a comparative analysis of the uterine transcriptome in viviparous and oviparous lizards **Genome Biol Evol.** 8, 10, 3226-3239. <http://dx.doi.org/10.1093/gbe/evw229>
 9. **Griffith, OW**, Brandley, MC, Whittington, CW, Belov, K, & Thompson MB (2017) Comparative genomics of hormonal signaling in the chorioallantoic membrane of oviparous and viviparous amniotes **Gen Comp Endocrinol**, 244, 19-29. <http://dx.doi.org/10.1016/j.ygcen.2016.04.017>
 8. **Griffith, OW**, Brandley, MC, Belov, K, & Thompson MB (2016) Allelic expression of mammalian imprinted genes in a matrotrophic lizard, *Pseudemoia entrecasteauxii*, **Dev Genes Evol.** 226 (2), 79-85. <http://dx.doi.org/10.1007/s00427-016-0531-x>
 7. Whittington, CW, **Griffith, OW**, Qi, W, Thompson, MB, & Wilson, AB (2015) Seahorse brood pouch transcriptome reveals common genes associated with vertebrate pregnancy, **Mol Biol Evol.** 32 (12), 3114-3131. <http://dx.doi.org/10.1093/molbev/msv177>
 6. **Griffith, OW** (2015) *Mechanisms of placental evolution: the genetics and physiology of pregnancy in lizards*. PhD Thesis, University of Sydney. <http://hdl.handle.net/2123/13600>
 5. **Griffith, OW**, Blackburn, DG, Brandley, MC, Van Dyke, JU, Whittington, CW, & Thompson, MB (2015) Ancestral state reconstructions require biological evidence to test evolutionary hypotheses: A case study examining the evolution of reproductive mode in squamate reptiles, **J of Exp Zool Part B**, 324 (6), 493-503. <http://dx.doi.org/10.1002/jez.b.22614>
 4. Van Dyke, JU, **Griffith, OW**, Thompson, MB (2014) High food abundance permits the evolution of placentotrophy: evidence from a placental lizard, *Pseudemoia entrecasteauxii*. **Am Nat** 184 (2), 198-210. <http://dx.doi.org/10.1086/677138>
 3. **Griffith, OW**, Ujvari, B, Belov, K, & Thompson, MB (2013) Placental lipoprotein lipase (LPL) gene expression in a placentotrophic lizard, *Pseudemoia entrecasteauxii*. **J of Exp Zool Part B**, 320 (7), 465-470. <http://dx.doi.org/10.1002/jez.b.22526>
 2. **Griffith, OW**, Van Dyke, JU, & Thompson, MB (2013) No implantation in an extrauterine pregnancy of a placentotrophic reptile. **Placenta**, 34 (16), 510-511. <http://dx.doi.org/10.1016/j.placenta.2013.03.002>
 1. Wongvilas, S, Deowanish, S, Lim, J, Xie, VRD, **Griffith, OW**, & Oldroyd, BP (2010). Interspecific and conspecific colony mergers in the dwarf honey bees *Apis andreniformis* and *A. florea*. **Insectes Sociaux**, 57 (3), 251-255. <http://dx.doi.org/10.1007/s00040-010-0080-7>

AWARDS AND HONOURS

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| 2016 | Jabez King Heydon Memorial Prize, (Awarded to the most meritorious PhD in the previous twelve months from the School of Life and Environmental Sciences, University of Sydney). |
| 2014 | Short Listed for the Hamilton Prize, Evolution 2014, Raleigh, North Carolina. |
| 2013 | Finalist Post-Graduate Excellence Prize, School of Biological Science, University of Sydney. |
| 2012 | Herpetologists League Graduate Research Prize, third place (Oral presentation) at the 7 th World Congress of Herpetology, Vancouver. |

2011 Australian Society of Herpetologists Murray Little John Award.

COMPETITIVE GRANTS

2019 University of Melbourne representative for Science at the Shine Dome, the annual meeting of the Australian Academy of Science, through competitive application, \$1000.
2018-21 Discovery Early Career Research Award, Australian Research Council, \$365 083
2018-21 University of Melbourne Establishment Grant, University of Melbourne \$50 000
2018-21 McKenzie Fellowship, University of Melbourne \$ 262 270. I withdrew from this fellowship because I was awarded the DECRA.
2017-20 University of Otago, Health Sciences Postdoctoral Fellowship \$228 688 (NZD). I withdrew from this fellowship because I was awarded the DECRA.
2015-17 Gaylord Donnelley Environmental Postdoctoral Fellowship, Yale University \$104 000 (USD)
2017 SMBE Registration Reimbursement Award \$450 (USD)
2016 SMBE Registration Reimbursement Award \$500
2014 University of Sydney Graduates Union of North America Alumni Scholarship, \$2 500
2014 University of Sydney Postgraduate Research Support Scheme, \$2 250
2014 Australian Society of Herpetologists' student research grant - Genomic imprinting in a reptilian model, \$1 250
2014 EMBL Australia Symposium Grant, \$100
2012 University of Sydney Postgraduate Research Support Scheme, \$1 610
2012-15 University of Sydney Thompson Lab top up Scholarship \$35 000
2012-15 Australian Post Graduate Award, \$ 83 048
2011 Australian Society of Herpetologists Travel Grant, \$250

STUDENT SUPERVISION

PhD Students

2018 – curr. **Teruhito Ishihara**, provisional thesis title, “The nature and role of epigenetic reprogramming in the development of an iconic marsupial, the tammar wallaby (*Macropus eugenii*)”

Masters students

2019 – curr. **Jinglin Wen**, provisional thesis title, “Comparing the potential for maternal-fetal signaling in oviparous and viviparous lizards”

Honours students

2017 – 2018 **Monty Oldroyd**, “Uterine changes during pregnancy and gravidity in the bimodally reproductive lizard *Lerista bougainvillii*: a transcriptome and histochemical analysis.”

INVITED PRESENTATIONS

2019 “Using evolution to study puzzles of human pregnancy”, University of Melbourne Visions Seminar Series, Melbourne, Victoria
2017 “Understanding implantation and implantation failure: an evolutionary perspective”, Special seminar – Centre for Prevention of Preterm Birth, Cincinnati Children’s Hospital, Cincinnati, Ohio
2017 “Evolution of the placenta: a tale of the first contact between mother and baby”, Brooklyn College biology seminar series, City University of New York, Brooklyn, New York
2017 “The evolutionary origin of embryo implantation” Yale Systems Biology Seminar Series, Yale, West Haven, Connecticut
2017 “Using marsupials to understand the origin of implantation in live bearing mammals”, Yale Evolution and Development Symposium, Yale, West Haven, Connecticut

- 2017 “Immune regulation is a key innovation of eutherian mammal pregnancy” Nano Biology Spring Seminar Series, Yale, West Haven, Connecticut
- 2017 “Maternal-fetal signalling and the evolution of a placenta in reptiles and mammals” Trinity College Biology Spring Seminar Series, Hartford, Connecticut
- 2016 “A molecular and ecophysiology approach to understanding the evolution of pregnancy in reptiles and mammals” – East Tennessee State University Biology’s Fall Seminar Series, Johnson City, Tennessee
- 2016 “Innovations of pregnancy; the molecular and ecological consequences of pregnancy in reptiles and mammals” – Yale Institute for Biospheric studies’ Autumn seminar series, New Haven, Connecticut
- 2014 “Parent offspring conflict and the evolution of placentae in reptiles”, University of New South Wales – Phenotypic Variation and Evolution symposium, Sydney, New South Wales
- 2014 “Complex innovations, parent offspring conflict and the evolution of the placenta”, Yale University West Campus Systems Biology Seminar, West Haven, Connecticut

CONFERENCE PAPERS

- 2018 **Griffith, OW**, Chavan, AR, Pavlicev, M, Protopapas, S, Callahan, R, Maziarz, J, Wagner, GP. Inflammatory maternal-fetal interactions and the origin of maternal recognition of pregnancy in mammals. Australian and New Zealand Society for Comparative Physiology and Molecular Biology 2018. Melbourne, Victoria (Presented by Griffith).
- 2018 **Griffith, OW**, Chavan, AR, & Wagner, GP. The implantation reaction evolved as a mode of endometrial recognition of pregnancy in the first live bearing mammals. Society of Reproductive Biology 2018. Adelaide, South Australia (Presented by Griffith)
- 2018 **Griffith, OW**, Chavan, AR, & Wagner, GP. Uterine recognition of pregnancy was an ancestral feature of the first live bearing mammals. Genetics Society of AustralAsia 2018. University of Canberra, ACT. (Presented by Griffith)
- 2017 **Griffith, OW** & Wagner, GP. Novel tissue interactions and the evolution of a new organ, the placenta. Society for Molecular Biology and Evolution Conference 2017. Austin, Texas. (Presented by Griffith)
- 2017 **Griffith, OW**, Chavan, AR, Protopapas, S, Maziarz, J, & Wagner, GP. The evolutionary origin of implantation in mammals: an examination of maternal-fetal interactions in the short tailed opossum. Society for Integrative and Comparative Biology, Conference 2017. New Orleans, Louisiana. (Presented by Griffith)
- 2016 **Griffith, OW**, Protopapas, S, Maziarz, J, & Wagner, GP. Parturition in marsupials is homologous to implantation in eutherian mammals. Society for Molecular Biology and Evolution Conference 2016. Gold Coast, Australia. (Presented by Griffith)
- 2016 Chavan, AR, **Griffith, OW**, Maziarz, J, Tzika, A, Milinkovitch, M, & Wagner, GP. How do mammals beat the heat? The evolution of the inflammatory response in pregnancy and the origin of decidual stromal cells. Euro Evo Devo 6th meeting, Uppsala, Sweden. (Presented by Chavan)
- 2015 **Griffith, OW**, Brandley, MC, Whittington, CW, Belov, K, & Thompson, MB. The evolution of embryonic – maternal communication in reptiles and mammals. Boden Research Conference - Comparative Animal Genomics Down Under 2015, Adelaide, South Australia. (Presented by Griffith)
- 2015 **Griffith, OW**, Brandley, MC, Belov, K, Van Dyke, JU, & Thompson, MB. Parent offspring conflict and the evolution of placental provisioning in the Southern grass skink, *Pseudemoia entrecasteauxii*. 39th Meeting of the Australian Society of Herpetologists, Victoria. (Presented by Griffith)
- 2015 Van Dyke, JU, Dudley, JS, **Griffith, OW**, Murphy, CR, & Thompson, MB How to make a baby lizard: the role of placental nutrient. 39th Meeting of the Australian Society of Herpetologists, Victoria. (Presented by Van Dyke)
- 2014 **Griffith, OW**, Brandley, MC, Belov, K & Thompson, MB. The evolution of placentae; complex trait evolution can be constrained by ancient features of an organism’s genome. Evolution 2014, Raleigh, North Carolina. (Presented by Griffith)

- 2014 Van Dyke, JU, **Griffith, OW**, Thompson, MB. Hungry mothers' ability to abort and cannibalize their offspring enables the evolution of placentotrophy in a lizard. Evolution 2014, Raleigh, North Carolina. (Presented by Van Dyke)
- 2014 **Griffith, OW**, Brandley, MC, Belov, K, & Thompson, MB. Reptilian placentae and the evolution of complex structures. 50th anniversary meeting of the Australian Society of Herpetologists, Greenhills, ACT. (Presented by Griffith)
- 2014 Van Dyke, JU, **Griffith, OW**, Thompson, MB. High food abundance permits the evolution of placentotrophy: evidence from a placental lizard, *Pseudemoia entrecasteauxii*. 50th anniversary meeting of the Australian Society of Herpetologists, Greenhills, ACT. (Presented by Van Dyke)
- 2013 **Griffith, OW**, Brandley, MC, Belov, K & Thompson, MB (2013) Convergent use of genes in the evolution of placentation in amniotes. 8th Biannual Meeting of the Australasian Evolution Society, Geelong, VIC (Presented by Griffith)
- 2013 **Griffith, OW**, Brandley, MC, Belov, K & Thompson, MB. Gene expression and the evolution of placental functions in reptiles. 2013 conference of the Genetics Society of AustralAsia, Sydney, NSW (Presented by Griffith)
- 2013 Whittington, CM, **Griffith, OW**, & Wilson, AB, Genomics and evolution of male pregnancy in seahorses and pipefish. 2013 conference of the Genetics Society of AustralAsia, Sydney, NSW (Presented by Whittington)
- 2013 McKenna, JA, **Griffith, OW**, & Thompson, MB. Using lizards to investigate the genetic mechanisms controlling uterine angiogenesis during live birth: consequences for cancer. 2013 conference of the Genetics Society of AustralAsia, Sydney, NSW (Presented by McKenna)
- 2013 Brandley, MC, **Griffith, OW**, & Thompson, MB. Transcriptomic analysis of the evolution of viviparity and placental function in lizards. Evolution 2013, Snowbird, Utah (Presented by Brandley)
- 2013 **Griffith, OW**, Brandley, MC, & Thompson, MB. Using next-generation sequencing to understand the functionality of the placenta of a placentotrophic lizard. Australian Society of Herpetologists 37th meeting, Point Wollstonecroft, NSW (Presented by Griffith)
- 2013 McKenna, JA, **Griffith, OW**, & Thompson, MB. Linking embryo survival and cancer susceptibility: using skinks to investigate the role of VEGF. Australian Society of Herpetologists 37th meeting, Point Wollstonecroft, NSW (Presented by McKenna)
- 2012 **Griffith, OW**, Belov, K, Beata U., & Thompson, MB. Lipoprotein lipase expression increases in the uterus of a pregnant skink. 7th World Congress of Herpetology, Vancouver, Canada (Presented by Griffith)
- 2011 **Griffith, OW**, Belov, K, & Thompson, MB. Patterns of lipoprotein lipase expression in the uterus of the southern grass skink. Australian Society of Herpetologists 36th meeting, Paluma, Queensland (Presented by Griffith)

TEACHING EXPERIENCE

- 2018 Lecturer *Zool20006 Comparative Animal Physiology* – University of Melbourne (4 lectures, 3 lectures on thermal ecology and 1 lecture on animal viviparity)
- 2018 Guest lecturer *Biol20001 Evolution: Making Sense Of Life* – University of Melbourne (1 lecture on the use of evolution for understanding human health and disease)
- 2018 Lecturer *Biol30002 Experimental Reproductive Physiology* – University of Melbourne (designed and ran a 6 week laboratory practical for 4 students)
- 2017 Guest lecturer *Comparative Anatomy* – Yale University (1 lecture)
- 2016 Guest lecturer *Functional Genomics Evolution* – Yale University (ran class reading group for 5 weeks)

Laboratory Demonstrating

- 2015 *Developmental Genetics*
- 2011-15 *Cell Biology*

2013-14	<i>Genetics and Genomics</i>
2012-13	<i>High School Biology Kick Start Program</i>
2012	<i>Biology Bridging Course</i>
2012	<i>Living Systems</i>

JOURNAL REVIEWER

2019	<i>BioEssays</i>
2018	<i>Proc. Nat. Acad. Sci. USA, Journal of Morphology, Placenta, Molecular Reproduction and Development, Molecular Therapy Nucleic Acids, Molecular Biology and Evolution, Frontiers in Immunology</i>
2017	<i>F1000, Placenta, Journal of Experimental Zoology Part A, Journal of Experimental Zoology Part B</i>
2016	<i>Placenta, Journal of Herpetology, Biological Journal of the Linnean Society, Journal of Experimental Zoology Part B</i>
2015	<i>Journal of Herpetology</i>
2014	<i>Journal of Experimental Zoology Part B, BMC Genomics, Journal of Herpetology</i>
2013	<i>Australian Journal of Zoology</i>
2012	<i>Physiological and Biochemical Zoology</i>

GRANT/PRIZE REVIEWER

2018	ARC Discovery Project Grants
2016 & 17	Yale Institute for Biospheric Studies, Small Grants Program
2017	E. E. Wilson Award - graduate student research grant
2017	Society for Integrative Biology's (DEDB division) best student oral presentation prize

MEDIA COVERAGE

- 2018 Article in *Science* magazine. Pennisi E. 2018 The key to a successful pregnancy: a tamed immune reaction. 10/1/2018 <https://www.sciencemag.org/news/2018/01/key-successful-pregnancy-tamed-immune-reaction>
- 2018 News article in *Nature*. Maxmen A. 2018. Armadillo and rabbit genes reveal how pregnancy evolved. 09/01/2018 https://www.nature.com/articles/d41586-018-00341-w?utm_source=fbk&utm_medium=social&utm_campaign=naturenews&sf178750189=1#ref-CR1
- 2017 Article for *The Conversation* – Griffith O.W. 2017 What marsupials taught us about embryo implantation could help women using IVF. 27/03/2017 <https://theconversation.com/what-marsupials-taught-us-about-embryo-implantation-could-help-women-using-ivf-81539>
- 2017 Article for *The Conversation* – Griffith O.W. 2017 Using the placenta to understand how complex organs evolve. 27/03/2017 <https://theconversation.com/using-the-placenta-to-understand-how-complex-organs-evolve-70107>
- 2016 Article for *The Conversation* – Griffith O.W. 2016 Pregnancy: cooperative paradise or conflict-driven battle between mother and child? 05/05/2016 <https://theconversation.com/pregnancy-cooperative-paradise-or-conflict-driven-battle-between-mother-and-child-58564>
- 2015 Whittington, et al. (2015) received a lot of media coverage including the highlights below:
 Editors pick in *Science* Magazine, summary by Sacha Vignieri
<http://www.sciencemag.org/content/350/6256/twil.full.pdf>
 Article for *The Conversation* – Whittington C.W. 2015 The secret sex life and pregnancy of a seahorse dad. 02/09/2015
 Article for *Science News* - by Sarah Zielinski 2015 <https://www.sciencenews.org/blog/wild-things/how-seahorse-dad-pregnant-woman>
 Article for *Live Science*, by Ashley P. Taylor <http://www.livescience.com/52107-male-seahorses-act-like-pregnant-mammals.html>
 Article for *Gizmodo*, by Diane Kelly <http://throb.gizmodo.com/seahorse-dads-do-much-more-than-just-shelter-their-babi-1729585408>

Article for *The Wire*, by Janaki Lenin <http://thewire.in/2015/09/14/no-absentee-fathers-among-seahorses-10680>

- 2014 Radio interview – Eggs-actly why do we give birth?, *2SER Breakfast with Mitch Byatt*, 2SER, 8.40am 28/08/2014 <http://www.2ser.com/component/k2/item/10769-eggs-actly-why-do-we-give-birth>
- 2014 Radio interview – *Mornings with Nadine Maloney*, ABC Radio Alice Springs 10.45am 25/08/2014 <https://soundcloud.com/abc-alice-springs/live-birth-in-some-reptiles-how-and-why>
- 2014 Article for *The Conversation* – Griffith O.W. 2014 Lizards help us find out which came first: The baby or the egg?, 20/08/2014

ORGANIZATIONAL MEMBERSHIP

- Society for Molecular Biology and Evolution
- Genetics Society of Australasia
- Society for the Study of Evolution
- Australasian Evolution Society
- Society for the Study of Amphibians and Reptiles
- Australian Herpetological Society
- Australian Society of Herpetologists