

# MAURICIO GONZÁLEZ-FORERO

4 SEPTEMBER 2024

## EDUCATION

- 2007 – 2013 **PhD** in Ecology and Evolutionary Biology  
I also took 6 postgraduate modules in Mathematics or Statistics:  
Mathematical Ecology I-II, Mathematical Evolutionary Theory, Stochastic Modelling, and Statistical Inference I-II.  
University of Tennessee, Knoxville, USA.  
Thesis: Evolution of acquiescence to manipulation.  
Advisor: Sergey Gavrilets.
- 1999 – 2006 **BSc** in Biology  
I also took 10 modules in Mathematics or Physics (equivalent to a **minor in Mathematics**):  
Calculus I-III, Linear Algebra, Multilinear Algebra, Ordinary Differential Equations, Vectorial Geometry, Mathematical Logic, Set Theory, and Physics I.  
University of Antioquia, Medellín, Colombia.  
Thesis: Species: a mathematical formalization.  
Advisors: Luís Fernando Echeverri (mathematics), Joao Muñoz (biology), and Ricardo Callejas (biology).

## RESEARCH POSITIONS

- 2018 – Feb 2024 **Research Fellow**  
Supervisor: Andy Gardner.  
University of St Andrews, UK.
- 2020 – 2021 ~3.8 months of furlough due to increased childcare responsibilities during the COVID pandemic. Overall, I estimate the pandemic delayed my work by ~7 months.
- 2016 – 2018 **Marie Skłodowska-Curie Individual Fellow**  
Supervisor: Andy Gardner.  
University of St Andrews, UK.
- 2013 – 2016 **Postdoctoral researcher**  
Supervisor: Laurent Lehmann.  
University of Lausanne, Switzerland.
- 2010 – 2012 **Graduate research associate**  
Funded by the National Institute of Mathematical and Biological Synthesis (NIMBioS).  
University of Tennessee, Knoxville, USA.

## TEACHING

- 2018 – 2019, 2023 **Guest lecturer**  
Designed and gave 1 lecture on Brain evolution: comparative neuroanatomy and controversies (3rd year Evolution module).  
Gave 3 lectures on Social Evolution (3rd year Evolution module).  
Essay setting, marking, and providing feedback (2nd and 3rd Evolution modules).  
University of St Andrews, UK.
- 2013 – 2016 **Teaching assistant**  
Grading master-student projects, mentoring students in the Experimental Design module, and assisting exercise sections of the Population genetics module.  
University of Lausanne, Switzerland.
- 2010 **In charge of a full module**  
Designed and gave all lectures, exams, and grading of the semester-long module.  
Course: Mathematics for Life Sciences. Aprox. 30 students from majors including Medicine and Psychology.  
University of Tennessee, Knoxville, USA.

2007 – 2009 **Graduate teaching assistant**

Teaching lab sections of the modules Biology, Genetics, and Mathematics for Life Sciences.  
University of Tennessee, Knoxville, USA.

## PREPRINTS

**González-Forero M**, Gómez-Robles A. Why did the human brain size evolve? A way forward. In review at *Phil Trans B*. Preprint: <https://doi.org/10.32942/X2T62W>.

Riffe T, Villavicencio F, **González-Forero M**. Sensitivity and decomposition of multistate healthy life expectancy. Submitted to *Demography*. Preprint: <https://dx.doi.org/10.4054/MPIDR-WP-2024-014>.

## PEER-REVIEWED PUBLICATIONS

My publication strategy focuses on quality rather than quantity. I thus encourage judgement of my publications by their content rather than their numbers.

**González-Forero M**. (2024) Evolutionary-developmental (evo-devo) dynamics of hominin brain size. *Nature Human Behaviour*. 8, 1321–1333.

**González-Forero M**. (2024) A mathematical framework for evo-devo dynamics. *Theoretical Population Biology*. 155, 24-50.

**González-Forero M**. (2023) How development affects evolution. *Evolution*. 77, 562-579.

\***González-Forero M**, \*Peña J. (2021) Eusociality through conflict dissolution. *Proc. R. Soc. B*. 288, 20210386.

**González-Forero M**, Gardner A. (2018) Inference of ecological and social drivers of human brain-size evolution. *Nature* 557, 554-557.

**González-Forero M**, Faulwasser T, Lehmann L. (2017) A model for brain life history evolution. *PLoS Computational Biology* 13, e1005380.

**González-Forero M**. (2015) Stable eusociality via maternal manipulation when resistance is costless. *Journal of Evolutionary Biology* 28, 2208-2223.

**González-Forero M**. (2014) An evolutionary resolution of manipulation conflict. *Evolution* 68, 2038-2051.

**González-Forero M**, Gavrillets S. (2013) Evolution of manipulated behavior. *American Naturalist* 182, 439-451.

**González-Forero M**. (2009) Removing ambiguity from the biological species concept. *Journal of Theoretical Biology* 256, 76-80.

\*Equal contribution

## RESEARCH GRANTS, AWARDS, AND HONOURS

Total awarded (at current exchange rates): ~ £210k.

2016 – 2018 Marie Skłodowska-Curie Individual Fellowship (€ **195,000**): Brain growth under social pressure: mathematical modelling of brain growth when individuals face social challenges. By the EU European Commission.

2010 – 2012 Graduate Research Assistantship (US\$ **40,000**): Evolution of eusociality mediated by maternal induction. By the USA National Institute for Mathematical and Biological Synthesis, NIMBioS.

2009 Funded attendance to the Santa Fe Institute Complex Systems Summer School By the Santa Fe Institute, Santa Fe, NM, USA (US\$ **550**).

2006 Undergraduate thesis award for “Species: a mathematical formalization”. By the Faculty of Natural and Exact Sciences, University of Antioquia, Colombia.

2005            Third place in the National Biology Exam for Undergraduates in Colombia (ECAES).  
By the Ministry of Education, Colombia.

#### **NEARLY SUCCESSFUL APPLICATIONS FOR FACULTY-LEVEL FELLOWSHIPS OR PERMANENT FACULTY POSITIONS**

2024            Lecturership in Applied Mathematics (not awarded). School of Mathematics & Statistics, University of Glasgow. Interviewed on 17-18 Jun 2024. Feedback stated that my research and teaching presentations and interview were excellent, but they chose a candidate with slightly more research overlap with the current research at the School.

2023            Lecturership in Quantitative Anthropology (not awarded). Department of Anthropology, UCL. Interviewed on 7 Jun 2023. Ranked 2nd. The top candidate was chosen because they had more teaching experience, already being a senior lecturer at another institution.

2023            EPSRC Open Fellowship (£1.4M, not awarded). Submitted 31 Jan 2022. Evaluated in the Mathematical Sciences panel. The 3 reviewers gave it perfect scores (6 out of 6). Interviewed on 24 Jan 2023. Decided on 9 Feb 2023: ranked 3rd. No feedback provided.

#### **UNSUCCESSFUL APPLICATIONS FOR FACULTY-LEVEL FELLOWSHIPS**

2021            Royal Society University Research Fellowship (£693k, not awarded). Submitted 3 Sep 2021. Advanced to review. Decided on 11 Mar 2022: not shortlisted for interview.

2018            ERC Starting Grant (€1.4M, not awarded). Submitted 4 Oct 2018. Decided on 29 Apr 2019: not shortlisted for step 2.

2018            Royal Society University Research Fellowship (£795k, not awarded). Submitted 31 Aug 2018. Advanced to review. Decided on 8 Mar 2019: not shortlisted for interview.

2018            BBSRC David Phillips Fellowship (£1.2M, not awarded). Submitted 9 May 2018. Decided on 30 Oct 2018: not shortlisted for interview.

2017            Royal Society Dorothy Hodgkin Fellowship (£622k, not awarded). Submitted 15 Nov 2017. Advanced to review. Decided on 31 Aug 2018: not shortlisted for interview.

#### **CONSULTANCY**

2023-2025      Sensitivity of human life expectancy to perturbation (€ 20,000). University of Basque Country, Spain.

#### **INVITED TALKS**

2025            (Pending funding approval) Volkswagen Foundation Scoping Workshop ‘Building a framework to integrate diverse routes to adaptation in a changing world’ organised by Melanie Dammhahn, Niels Dingemanse, Pim Edelaar, Sam Patrick, Denis Réale, and Alastair Wilson.

2024            (Upcoming) School of Psychology & Neuroscience, University of St Andrews, UK.

                    Talk at symposium Connecting Macro and Micro Evolution of Form and Function Relationships at the Evolution Conference, Montreal, Canada (given virtually).

                    Royal Society meeting “Natural Selection Shapes Animal Cognition” in Bath, UK, organised by Elli Leadbeater and Alex Thornton. As an invited speaker, I have also been invited to contribute to a themed issue of *Philosophical Transactions of the Royal Society B*.

2023            Institute Seminar. Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany.

                    Salguero-Gómez lab meeting, Department of Biology, University of Oxford, UK.

                    Applied Mathematics Seminar series, School of Mathematics & Statistics, University of St Andrews, UK.

- 2022 Research Away Day, School of Biology, University of St Andrews, UK.
- 2020 Institute for Advanced Studies, Toulouse, France. Online due to pandemic.
- 2019 School of Biological Sciences, University of Aberdeen, UK.  
 Evolutionary Anthropology Research Group, Department of Anthropology, Durham University, UK.  
 Applied Mathematics Seminar series, School of Mathematics & Statistics, University of St Andrews, UK.
- 2018 Stochastic Models for the Inference of Life Evolution group at the Collège de France in Paris.
- 2017 Department of Zoology, University of Cambridge.  
 Department of Human Behavior, Ecology and Culture at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany.
- 2016 Centre for Biological Diversity, School of Biology, the University of St Andrews, UK.
- 2015 Department of Evolutionary Theory, Max Planck Institute for Evolutionary Biology, Plön, Germany.
- 2012 Joshua Plotkin group, University of Pennsylvania, USA.

#### **ORGANISED WORKSHOPS AND SYMPOSIA**

- 2020 Co-organiser of Fellowship writing workshop for the School of Biology. 10 speakers from the University of St Andrews. University of St Andrews, UK.
- 2019 Co-organiser of the symposium “Life history evolution: bridging theory and data”. Congress of the European Society for Evolutionary Biology (ESEB2019), Turku, Finland.

#### **UNIVERSITY ADMINISTRATION EXPERIENCE**

- 2022 – 2024 Early Career Representative of the School of Biology for the Institute of Behavioural and Neural Sciences (IBANS), University of St Andrews.
- 2019 – 2021 Postdoctoral representative for the Biology Equality and Diversity Committee, School of Biology, University of St Andrews.

#### **REVIEWER FOR**

*American Naturalist, Biological Reviews, Bulletin of Mathematical Biology, Evolution, Evolution Letters, Journal of Evolutionary Biology, Journal of Theoretical Biology, Nature, Nature Communications, Nature Ecology and Evolution, PLoS ONE, Proceedings of the Royal Society B, Science Advances, Theoretical Population Biology.*

#### **GRANTS REVIEWED FOR**

Research Foundation - Flanders (Belgium).

#### **CONTRIBUTED CONFERENCE PRESENTATIONS**

- 2024 Virtual talk. Evolution conference.
- 2022 Talk. Mathematical Models in Ecology and Evolution conference. Reading, UK.  
 Talk. Euro Evo-Devo. Naples, Italy.  
 Talk. Population Genetics Group. Online.
- 2021 Talk. Evolution conference. Online.
- 2019 Talk. Mathematical Models in Ecology and Evolution conference. Lyon, France.

- Talk. European Human Behaviour and Evolution Association conference. Toulouse, France.
- 2018 Talk. Models in Population Dynamics, Ecology, and Evolution conference. Leicester, UK.
- 2017 Talk. European Human Behaviour and Evolution Association conference. Paris, France.
- 2016 Talk. Institute of Behavioural and Neural Sciences mini symposium. St Andrews, UK.
- Talk. European section of International Union for the Study of Social Insects conference. Helsinki, Finland.
- Talk. Swiss Biology '16 conference. Lausanne, Switzerland.
- 2015 2 posters. European Society for Evolutionary Biology conference. Lausanne, Switzerland.
- Talk. Mathematical Models in Ecology and Evolution conference. Paris, France.
- Poster. 3<sup>rd</sup> Economics and Biology Workshop of the Institute of Advanced Study. Toulouse, France.
- 2012 Talk. Society for Mathematical Biology conference. Knoxville, TN, USA.
- Talk. Evolution conference. Ottawa, Canada.
- 2011 Talk. Evolution conference. Norman, OK, USA.
- 2010 Talk. Biocomplextixy<sup>XI</sup> conference: The evolution of cooperation. Bloomington, IN, USA.
- 2007 Talk. South Eastern Population Ecology and Evolutionary Genetics meeting. Tremont, TN, USA.
- 2005 Poster. European Conference on Mathematical and Theoretical Biology. Dresden, Germany.

#### **ATTENDED WORKSHOPS**

- 2017 2 workshops. Mean field games, and Numerical methods for optimal control problems. Sapienza University. Rome, Italy.
- 2015 Workshop. 3<sup>rd</sup> Economics and Biology Workshop, Institute for Advanced Study. Toulouse, France.
- 2014 Workshop. Social evolution: merits and limitations of inclusive fitness theory. Arolla, Switzerland.
- 2010 – 2012 Working group. Large scale demographic, network and behavioral trait analyses of sociality. Four meetings at National Evolutionary Synthesis Center, Durham, USA.
- 2009 Summer Program. Mathematical Biosciences Institute Summer Graduate Program. Columbus, OH, USA.
- 2009 Complex Systems Summer School. Santa Fe Institute. Santa Fe, NM, USA.
- 2004 Workshop. Bases in Studies of Entomologic Diversity in Ibero-America. Quito and Yasuni National Park, Ecuador.

#### **ADDITIONAL FUNDING**

- 2015 Travel grant. **€500** by the Institute for Advanced Study, Toulouse, France to attend the Institute's 3<sup>rd</sup> Economics and Biology Workshop.
- 2012 Travel grant. **US\$1000** by the National Institute of Mathematical and Biological Synthesis and **US\$350** by the Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville to attend the Evolution conference in Ottawa, Canada.

- 2011 Travel grant. **US\$500** by the National Institute of Mathematical and Biological Synthesis, **US\$200** by the Graduate Researchers in Ecology, Behavior and Evolution of UTK, and **US\$200** by the Department of Ecology and Evolutionary Biology to attend the Evolution conference in Norman, OK, USA.
- 2010 Travel grant. **US\$400** by the workshop committee and **US\$500** by the National Institute of Mathematical and Biological Synthesis to attend Biocompletxy<sup>XI</sup>.  
Travel grant. **US\$650** by NIMBioS to visit Gro Amdam and James Hunt at Arizona State University.
- 2009 Travel grant and stipend. **US\$400** of travel support and a stipend of **US\$300** by the Mathematical Biosciences Institute to attend their Summer Graduate Program.  
Travel grant. **US\$ 800** by the Department of Ecology and Evolutionary Biology of the University of Tennessee, Knoxville, to attend the Santa Fe Institute Summer School and the Mathematical Biosciences Institute Summer Program. Declined.
- 2005 Undergraduate thesis improvement grant. ~**US\$30** by the Research Development Committee (CODI) of the University of Antioquia.  
Travel grant. **US\$1040** by the Society for Mathematical Biology and **€950** by the European Society of Mathematical and Theoretical Biology to attend the European Conference on Mathematical and Theoretical Biology and the Society of Mathematical Biology conference in Dresden, Germany.

## OUTREACH PUBLICATIONS

**González-Forero M.** (2018) The human brain from ecology and seemingly culture. Behind the paper blog post at *Nature Ecology and Evolution Community*.

<https://communities.springernature.com/posts/the-human-brain-from-ecology-and-seemingly-culture>

**González-Forero M.** (2018) Why do humans have such large brains? Our study suggests ecology was the driving force. *The Conversation*.

<https://theconversation.com/why-do-humans-have-such-large-brains-our-study-suggests-ecology-was-the-driving-force-96873>

## SELECTED MEDIA COVERAGE

- 2024 PNAS journal club. <https://www.pnas.org/post/journal-club/model-humans-got-their-big-brains-stirs-interest-and-controversy>.  
Science Alert. <https://www.sciencealert.com/a-change-in-the-development-of-our-ovaries-could-have-led-to-bigger-brains>.  
Phys Org. <https://phys.org/news/2024-05-evolutionary-biologist-human-brain-grew.html>  
United Arab Emirates Business Journal. <https://theubj.com/uae/science/157738/ovarian-developmental-shift-may-have-paved-the-way-for-human-brain-expansion/amp/>.
- 2023 I F\*cking Love Science, among others. <https://www.iflscience.com/we-may-finally-know-why-humans-have-such-big-brains-70453>.
- 2021 Brain evolution work featured in article by Science Illustrated (Sweden).
- 2019 Article by the European Commission research press.  
<https://ec.europa.eu/research-and-innovation/en/projects/success-stories/all/why-humans-have-very-big-brains>  
Article by Discover Magazine. State of Science: Finding Human Ancestors in New Places.  
<https://www.discovermagazine.com/planet-earth/state-of-science-finding-human-ancestors-in-new-places>

- 2018 Interviewed by The Associated Press (USA), the AFP (France), New Scientist (UK), Dagens Nyheter (Sweden), LA Times (USA), Vox (USA), La Vanguardia (Spain), TBS eFM Radio (Korea), Weekendavisen (Denmark), among others.
- Article by the Associated Press. Study offers new look at why our brains evolved to be so big.  
<https://apnews.com/7fe4e81cbb114ee2adf42c6e49f19b45/Study-offers-new-look-at-why-our-brains-evolved-to-be-so-big>
- Article by LA Times. Can simulating evolution on a computer explain our enormous brains?  
<http://www.latimes.com/science/sciencenow/la-sci-sn-human-brain-evolution-20180523-story.html>
- Article by Vox. Why do humans have such huge brains?  
<https://www.vox.com/science-and-health/2018/5/23/17377200/human-brain-size-evolution-nature>
- Article by New Scientist. We may have got the evolution of our big brains entirely wrong.  
<https://www.newscientist.com/article/2169862-we-may-have-got-the-evolution-of-our-big-brains-entirely-wrong/>
- Radio interview by TBS eFM Radio This Morning program.  
<http://cdn.podbbang.com/data1/tbsadm/thism180529002.mp3>
- 2017 Interviewed by PBS Newshour (USA). Why did humans evolve big brains? We don't know, but math can help.  
<http://www.pbs.org/newshour/rundown/humans-evolve-big-brains-dont-know-math-can-help/>
- ScienceDaily. How big brains evolved could be revealed by new mathematical model.  
<https://www.sciencedaily.com/releases/2017/03/170309142339.htm>
- EOS Wetenschap. Wiskundig model helpt de evolutie van grote breinen beter begrijpen.  
<https://www.eoswetenschap.eu/psyche-brein/wiskundig-model-helpt-de-evolutie-van-grote-breinen-beter-begrijpen>
- ANSA Scienza&Tecnica. Un modello matematico ricostruisce l'evoluzione dei grandi cervelli.  
[http://www.ansa.it/canale\\_scienza\\_tecnica/notizie/fisica\\_matematica/2017/03/10/un-modello-matematico-ricostruisce-levoluzione-dei-grandi-cervelli-\\_1be94a2f-bcb9-43d5-a0ea-e70c8e7d6e46.html](http://www.ansa.it/canale_scienza_tecnica/notizie/fisica_matematica/2017/03/10/un-modello-matematico-ricostruisce-levoluzione-dei-grandi-cervelli-_1be94a2f-bcb9-43d5-a0ea-e70c8e7d6e46.html)
- 2013 Nature World News. How manipulation becomes altruism: a study.  
<http://www.natureworldnews.com/articles/3548/20130820/manipulation-becomes-altruism-study.htm>
- Business Standard. Altruism may have origins in manipulation.  
[http://www.business-standard.com/article/news-ani/altruism-may-have-origins-in-manipulation-113082000973\\_1.html](http://www.business-standard.com/article/news-ani/altruism-may-have-origins-in-manipulation-113082000973_1.html)
- Science World Report. The evolution of manipulation: altruism created by manipulated behaviour.  
<http://www.scienceworldreport.com/articles/8899/20130819/evolution-manipulation-altruism-created-manipulated-behavior.htm>
- Der Standard. Manipulation könnte Wurzel für selbstloses Verhalten sein.  
<http://derstandard.at/1376533943228/Manipulation-koennte-Wurzel-fuer-selbstloses-Verhalten-sein>