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Owen M. Gilbert

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Research Focus

Evolutionary origins of complex traits and their consequences for diversification and the history of life. Integrates population-genetic theory, comparative biology, and experimental research on social amoebae to investigate how multicomponent traits evolve, how their original functions differ from their long-term effects, and how evolutionary innovations create opportunities for ecological expansion and macroevolutionary change.

Education

2011 **Ph.D. Rice University. Department of Ecology and Evolutionary Biology.**
Advisors: Joan E. Strassmann and David C. Queller.
Dissertation: Kinship and the evolution of altruism in social amoebae and a model for the evolution of kin-limited interactions.

2002 **B.S. Yale University. Department of Ecology and Evolutionary Biology.**
Advisor: Leo W. Buss
Thesis Topic: Individuality and group advantages in the colonial rotifer *Sinantherina socialis.*

Publications

2020 **Gilbert, O. M.** Natural reward drives the advancement of life. *Rethinking Ecology* 5: 1-35. (14,000+ views; Highlighted on Laboratory News, Phys.org, Eurekalert!, and Evolution News).

2015 **Gilbert, O. M.** Histocompatibility as adaptive response to discriminatory within-organism conflict: a historical model. *American Naturalist.* 185:2. 228-242.

2012 **Gilbert, O. M.**, Strassmann, J. E., and Queller, D. C. High relatedness in a social amoeba: the role of kin-discriminatory segregation. *Proceedings of the Royal Society B*. 279: 2619-2624.

2012 **Gilbert, O. M.**, Kuzdzal-Fick, J. J., Queller, D. C., and Strassmann, J. E. Mind the gap: a comparative study of migratory behavior in social amoebae. *Behavioral Ecology and Sociobiology*. 66:1291–1296.

2011 Strassmann, J. E., **Gilbert, O. M.**, and Queller, D. C. Kin discrimination and cooperation in microbes. *Annual Review of Microbiology*. 65: 349-367.

2009 **Gilbert, O. M.**, Queller, D. C., and Strassmann, J. E. Discovery of a large clonal patch of a social amoeba: implications for social evolution. *Molecular Ecology*. 18:6 1273-1281. (Yoon, C. Oozing through the Texas soil, a team of amoebae billions strong. *The New York Times.* March 24 edition [2007]; NPR radio, *Science Daily*; cited in Bourke, A. *Principles of Social Evolution* [2011] and *The Wall Street Journal*, March 10, 2014).

2007 **Gilbert, O. M.**, Foster, K. R., Mehdiabadi, N. J., Strassmann, J. E. and Queller, D. C. High relatedness maintains multicellular cooperation in a social amoeba by controlling cheater mutants. *Proceedings of the National Academy of Sciences of the United States of America*. 104:21, 8912-8917. (Goymer, P. Cheating gets you nowhere. *Nature Reviews Genetics.* 8.7 [2007]; *Science Daily*; cited in Bourke, A. *Principles of Social Evolution* [2011] and Krebs, Davies and West, *An Introduction to Behavioral Ecology*, 4th ed., pp. 310-311 [2012]).

2005 **Gilbert, O. M.** and Buskey, E. J. Turbulence decreases the hydrodynamic predator sensing ability of the calanoid copepod *Acartia tonsa*. *Journal of Plankton Research*. 27:10, 1067-1071.

COMMENTARIES

2018 **Gilbert, O. M.** Altruism or association? *Proceedings of the National Academy of Sciences of the United States of America*. 115:E3069–E3070 (comment on Wang and Lu 2018 and see Gilbert 2017 preprint)

2015 **Gilbert, O. M.** Microscale kin discrimination in a famous soil bacterium. *Proceedings of the National Academy of Sciences of the United States of America.* 112: 13757-8 (comment on Stefanic *et al.* 2015).

PREPRINTS

2019 **Gilbert, O. M.** Natural reward as the fundamental macroevolutionary force. *arXiv preprint arXiv:1903.09567* (this article has been downloaded by 40+ countries on Academia.edu. It expands the theoretical framework underlying *Natural reward drives the advancement of life*).

2017 **Gilbert, O. M.** Association theory: a new framework for analyzing social evolution. BioRxiv doi: https://doi.org/10.1101/197632. (Framework for unifying kin discrimination and association-based social evolution).

MANUSCRIPTS AND WORK IN PROGRESS

Gilbert, O. M. The evolution of kin recognition.

Gilbert, O. M. Disentangling Hamilton's rule from inclusive fitness.

Book Project

Gilbert, O. M. *The Advancement of Life: How Natural Reward Gives Evolution the Power to Innovate.* Book manuscript in progress.

Invited Talks

2023 United States Pentagon. "How to reward innovation and encourage entrepreneurship in US defense research." Feb. 2.

2015 University of California, Irvine, Department of Ecology and Evolutionary Biology. "What inclusive fitness theory is and how it can be extended." May 6.

2013 University of Chicago, Department of Ecology and Evolution. "Darwinian gradualism as the key to resolving the paradox of genetic kin recognition." Dec. 16.

2011 M. D. Anderson, Department of Systems Biology. "Cooperation in social amoebae and the evolution of hypervariable recognition genes." Invited talk. Feb. 2.

2009 University of Texas, Department of Integrative Biology. "Social amoebae as indicators of anomaly." Feb. 16.

Conference and Campus Talks

2024 University of Texas at Austin. "Kin selection and Hamilton's rule in aggressive turkeys and cannibalistic salamanders." Brain Behavior and Evolution Seminar. Sep. 6.

2022 University of Texas at Austin. "Complex kin recognition systems in brainless organisms." Brain Behavior and Evolution. May 13.

2019 University of Texas at Austin. "Evidence for the theory of natural reward." Integrative Biology Seminar. May 9.

2018 University of Texas at Austin. "Natural reward as the fundamental macroevolutionary force." Integrative Biology Seminar. Oct. 11.

Evolution Conference Montpellier, France. "Convergent evolution of genetic kin recognition and the predictive power of evolutionary theory." 14-min talk. Aug. 23.

Conference and Campus Talks (Cont.)

2018 University of Texas at Austin. "Convergent evolution of genetic kin recognition and the predictive power of evolutionary theory." Integrative Biology Seminar. Apr. 19.

2016 University of Texas at Austin, “Association Theory is the missing link connecting inclusive fitness and major transitions” Integrative Biology Seminar. Mar. 8.

2015 Washington University, St. Louis. “What inclusive fitness theory is.” Organismality Conference. May 22.

2014 University of Texas, Department of Integrative Biology. “The evolution of histocompatibility.” Sep. 25.

2011 Kavli Institute for Theoretical Physics, "A critical look at the field of microbial social evolution." Jan. 22.

Evolution Conference, Norman, OK. “A selfish genome model of kin recognition.” 15-minute talk. Jun. 21.

2010 University of Indiana, Biocomplexity XI Conference. "Why do organisms limit interactions to kin?" 20-minute talk. Dec. 5.

2009 University of Houston, Graduate Student Conference. "The prerequisites for altruism in a social amoeba: a role for kin discrimination?" 15-minute talk. Mar. 15.

Rice University Institute of Biosciences and Bioengineering Conference. "Self/not-self recognition: cheater control or conflict avoidance?" Dec. 7.

2008 Rice University Institute of Biosciences and Bioengineering Conference. "The causes of high relatedness in the social amoeba *Dictyostelium discoideum*."

Public Scholarship and Science Communication

2020 University of Texas at Austin. "On the advancement of life." Osher Life Long Learning Institute Lecture. Apr. 24.

2021–Present **Natural Reward Podcast**. Creator and host. Podcast on evolutionary theory, scientific innovation, and the history and philosophy of science.
Selected research episodes: “Updating the software of social evolution to patch the kin-recognition bug” (2023); “Hamilton’s rule and inclusive fitness, part I” (2026); “The blind entrepreneur: How natural reward scales life’s greatest inventions” (2026).

Posters

2015	Organismality conference at Washington University, St. Louis. "A formalization and extension of inclusive fitness theory."
2009	Rice University Institute of Biosciences and Bioengineering Conference. "The logic of kin association preference and the evolution of genetic kin recognition."
2005	Gordon Conference on Microbial Population Biology. "The control of cheating by relatedness in *Dictyostelium discoideum*."

Programs and Conferences

2018	Evolution Conference. Montpellier, France. Aug 18-22.
2015	Organismality Conference. Washington University, St. Louis. May 21-25.
2013	Kavli Institute for Theoretical Physics Program on Cooperation and the Evolution of Multicellularity. Santa Barbara, CA. Jan. 7 – Feb. 8.
2011	Evolution Conference. Norman, OK. June 18 – 21.
2010	Biocomplexity XI Conference. Bloomington, IN. Dec. 3 – 5.
2009	Darwin 2009 Conference. Stony Brook, NY. Nov. 4 – 8.
2005	Gordon Conference, Microbial Population Biology. Andover, NH. Jul. 17-22.

Teaching

2020	Evolution discussions for the Fortis Academy "A classic Christian School" in Liberty Hill, TX (via Zoom conferences).
2016	Major Transitions in light of Association Theory (Seminar)
2010	Section Leader for Freshman Seminar in Ecology and Evolution.
2006	Teaching Assistant for Tropical Field Biology.
2004, 2005	Teaching Assistant for Evolution.

Courses Prepared to Teach

Evolutionary Biology; Behavioral Ecology; Social Evolution; Evolutionary Theory; Major Transitions; Philosophy and History of Biology (cross-listed).

SERVICE

Reviewer for PNAS (5), Proceedings of the Royal Society B (2), Evolution; Biological Journal of the Linnean Society; Scientific Reports, Trends in Microbiology, Biological Bulletin, Environmental Microbiology Reports, BioRisk, Academia Letters

Grant Review AXA Research Fund, US–Israel Binational Science Foundation (2); UK NERC

2005-2011 Judge for Rice and UHD Undergraduate Research Symposia.

RESEARCH METHODS & SKILLS

- Field and laboratory work with *Dictyostelium sp.* and natural clones
- Kin discrimination assays, mix experiments, segregation assays
- Microsatellite genotyping and relatedness estimation
- Fluorescent labeling and time-lapse videography
- Population-genetic and game-theory modeling
- Evolutionary theory of multicomponent traits with interactive loci

REFERENCES

Professor Joan E. Strassmann
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