



HISTORY

- June 2014-Present** **Visiting Researcher, University of Texas Department of Integrative Biology.**
I [generalized](#) my model of [histocompatibility](#), and reviewed the evidence for its predictions across four levels of biological organization. I also proposed a [new theory of macroevolution](#) based on an extension of Darwin's metaphors. This theory invokes an alternative deterministic force of evolution, natural reward, and a different form of competition, which occurs as a race to innovate. I will be developing this theory further in an upcoming paper and book.
- June 2011-June 2014** **Independent work in Dallas, TX and Kavli Institute for Theoretical Physics.**
I developed a model for the evolution of histocompatibility, resolving the outstanding problem of genetic kin recognition, and I performed background research for a new theory of macroevolution.
- 2011** **Ph. D. Rice University. Department of Ecology and Evolutionary Biology.**
Advisors: David C. Queller and Joan E. Strassmann.
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. (Highlighted on [Phys.org](#), [Eurakalerts](#), [Unfold Times](#), [FloridaNewsTimes](#), [LaboratoryNews](#), [Reddit](#), [Evolution News](#), and my own [blog](#)).
- 2019** **Gilbert, O.M.** [Natural reward as the fundamental macroevolutionary force.](#) *arXiv preprint arXiv:1903.09567* (viewed by 26 countries on Academia.edu).
- 2018** **Gilbert, O.M.** [Altruism or association?](#) *Proceedings of the National Academy of Sciences of the United States of America*. 115:E3069-E3070.
- 2017** **Gilbert, O. M.** [Association theory: a new framework for analyzing social evolution.](#) BioRxiv doi: <https://doi.org/10.1101/197632>.

- 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.
- 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.**, 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.
- 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.
- 2011 Strassmann, J. E., **Gilbert, O. M.**, and Queller, D. C. [Kin discrimination and cooperation in microbes](#). *Annual Review of Ecology, Evolution, and Systematics*. 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.

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.

TALKS

- 2020** University of Texas at Austin. "[On the advancement of life.](#)" Osher Life Long Learning Institute Lecture. April 24, 2020.
- 2019** University of Texas at Austin. "Evidence for the theory of natural reward." Integrative Biology Seminar. May 9, 2019.
- 2018** University of Texas at Austin. "Natural reward as the fundamental macroevolutionary force. Integrative Biology Seminar. Oct. 11, 2018.
- Evolution Conference Montpellier, France. "Convergent evolution of genetic kin recognition and the predictive power of evolutionary theory." 14-min talk. August 23, 2018.
- University of Texas at Austin. "Convergent evolution of genetic kin recognition and the predictive power of evolutionary theory." Integrative Biology Seminar. April 19, 2018.
- 2016** University of Texas at Austin "Association Theory is the missing link connecting inclusive fitness and major transitions" Integrative Biology Seminar. March 8.
- 2015** Washington University, St. Louis. "What inclusive fitness theory is." Organismality Conference. May 22.
- University of California, Irvine, Department of Ecology and Evolutionary Biology. "What inclusive fitness theory is and how it can be extended." May 6.
- 2014** University of Texas, Department of Integrative Biology. "The evolution of histocompatibility." Sep. 25.
- 2013** University of Chicago, Department of Ecology and Evolution. "Darwinian gradualism as the key to resolving the paradox of genetic kin recognition." Dec. 16.
- Kavli Institute for Theoretical Physics, "[A critical look at the field of microbial social evolution.](#)" Jan. 22.
- 2011** Rice University. Studying the origin of new units of selection. Guest lecture for Philosophy of Biology (M. Fagan). Feb. 23.
- M. D. Anderson, Department of Systems Biology. "Cooperation in social amoebae and the evolution of hypervariable recognition genes." Invited talk. Feb. 2.
- 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 Texas, Department of Integrative Biology. "Social amoebae as indicators of anomaly." Invited talk. Feb. 16.

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, 2009

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

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*."

REVIEWER SERVICE

PNAS (4)	Molecular Mechanisms of Life History Evolution (chapter)
Proceedings of the Royal Society B (2)	AXA Research Fund (Grant)
Evolution	United States-Israel Binational Science Foundation (Grant)
Biological Bulletin	Natural Environment Resource Council (Grant)
Environmental Microbiology Reports	Biorisk
Biological Journal of the Linnean Society	
Trends in Microbiology	

AWARDS

2003-2010	Wray-Todd Graduate Fellowship. Rice University.
2007, 2009	Best Graduate Student Paper (Ecology and Evolution). Rice University.
2006, 2009	Houston Livestock and Rodeo Scholarship.
2001	Henry David Thoreau Internship. Yale University.

OUTREACH AND SOCIETIES

2020 Evolution discussions for the Fortis Academy, a high school in Liberty Hill, TX (via Zoom conferences).

2011-2016 Member of the Society for the Study of Evolution.

2012-2017 Member of the American Society of Naturalists.

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

TEACHING

- 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.

SPECIAL SKILLS

Use and maintenance of ABI 3100 Genetic Analyzer. PCR. Microsatellite analysis using Genemapper software (Applied Biosystems). Relatedness analysis using Relatedness 5.0 (Goodnight Software). Image J. Adobe Creative Suite. Game theory. Methods for evolutionary research on social amoeba: cultivation from soil, natural fruiting body isolation, mix experiments, liquid culture, racing experiments, quantification of migration, segregation assays, induction of abnormal development, rapid recapitulation, developmental timing mutant assays, farming assays, ecological selection regimes. Microscopy and time lapse videography. Microscale digital photography, published in *Science*, *Natural History*, *The New York Times*, *Current Biology*, *PNAS*, *Evolution*, *ASM News*, *BMC Evolutionary Biology*, major textbooks in animal behavior, evolution, and microbiology, popular non-fiction, encyclopedias, and on the covers of *Evolution* and *Molecular Ecology*.

RESEARCH INTERESTS

I am broadly interested in ecology, evolution, and behavior. I have a special interest in cellular slime molds, plasmodial slime molds, fungi, and marine invertebrates. These organisms, historically overlooked by social evolutionists studying terrestrial arthropods and vertebrates, provide very different insights on social evolution. They have unique habits that provide a different glimpse on aspects of social evolution that are difficult to view in other model systems. The researchers studying these organisms have taken different approaches, which in some cases are more illuminating to the detailed structures of complex traits. I have taken a conceptual approach to basic theory, centered on the use of metaphor, and I use simple mathematical models for deriving broad-scale predictions about general processes. At present, I have a number of detailed predictions that allow for hypothetico-deductive research from a comparative approach using social amoebae as a model.

KEY WORDS

Social Evolution, macroevolution, behavioral ecology, diversity, complexity, game theory, kinship, philosophy, kin recognition, kin association, somatic compatibility, histocompatibility, mycelial compatibility, plasmodial compatibility, root interactions, plant kin recognition, outer membrane exchange, complex traits, individuality, organismality, natural selection, natural reward, survival of the fittest, success of the innovative, adaptation, optimization, innovation, progress, advancement.

REFERENCES

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