

John Marshall, PhD

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Short Bio

I am an infectious disease modeler with expertise in malaria epidemiology and the use of novel, genetics-based strategies to reduce the burden of mosquito-borne diseases. I have worked on several aspects of gene drive technology, including the use of mathematical models to inform construct design, fitting models to experimental data, and modeling mosquito ecology and the epidemiology of mosquito-borne diseases. I also have experience in the field and with addressing social, cultural and regulatory aspects of my work. In my current position at UC Berkeley, I teach two courses on mathematical modeling of infectious diseases, consult generally in this field, and direct a laboratory specializing in mathematical models of mosquito-borne diseases and novel strategies for their control and elimination.

Appointments

2020 (July)-:

Associate Professor in Residence

Divisions of [Epidemiology & Biostatistics](#), [School of Public Health](#), [UC Berkeley](#)

2015 (January)-2020 (June):

Assistant Professor in Residence

Divisions of [Epidemiology & Biostatistics](#), [School of Public Health](#), [UC Berkeley](#)

- Conducting research on mathematical epidemiology, malaria elimination, mosquito ecology and novel vector control strategies
- Teaching graduate level courses on infectious disease modeling
- Mentoring graduate students in epidemiology, biostatistics, computational biology and mathematical modeling

2012 (October)-2014 (December):

Medical Research Council Research Fellow

[Department of Infectious Disease Epidemiology](#), [Imperial College London](#)

- Worked towards designing confined field trials of GM mosquitoes on islands off the coast of Africa
- Developed skills in analysis of large data sets – data cleaning, cluster analysis, model fitting and Markov Chain Monte Carlo methods
- Mentored graduate students in global health and mathematical modeling

2013 (October)-2014 (April):

Visiting Scholar

[Center for Theoretical Evolutionary Genomics](#), [UC Berkeley](#)

- Investigated methods to determine the structure and demographic history of malaria-transmitting mosquito populations from genomic data

2010 (August)-2012 (September):

Research Associate

[Department of Infectious Disease Epidemiology](#), [Imperial College London](#)

- Conducted surveys of human movement patterns of relevance to malaria transmission in Mali, Burkina Faso, Zambia and Tanzania
- Developed models for mosquito control and malaria epidemiology
- Co-organized a course on mathematical modeling of infectious diseases for public health professionals

2009 (July)-2010 (July):

Postdoctoral Scholar

[Division of Biology and Biological Engineering, Caltech](#)

- Designed new gene drive systems and developed mathematical models describing their spread
- Developed skills in genetic engineering and maintaining laboratory mosquito lines
- Trained graduate and postdoctoral students in population genetics

2009 (January-June):

Postdoctoral Fellow

[Center for Society & Genetics, UCLA](#)

- Analyzed surveys on the perspectives of people in Mali, West Africa to genetically modified mosquitoes for malaria control
- Analyzed international regulations for the environmental release of genetically modified mosquitoes
- Developed and lectured a class entitled "Genetic engineering in developing countries"

2008 (July-December):

Postdoctoral Researcher

[Department of Ecology & Evolutionary Biology, UCLA](#)

Based at: [Malaria Research and Training Center, University of Bamako](#), Mali

- Led a research team surveying the perspectives of people in Mali, West Africa to GM mosquitoes for malaria control
- Participated in ecological studies of mosquito dispersal
- Lectured and helped organize a WHO-sponsored workshop on developing a regulatory framework for releasing GM mosquitoes in Africa

2001 (January-December):

Editor

[Craccum magazine, Auckland University Students' Association](#), New Zealand

- Edited a 48-page weekly magazine for students at the University of Auckland
- Managed a staff of ~30 writers, photographers, distributors, designers, webmasters and advertising managers
- Developed skills in written and verbal communication and leadership

Education

2003 (August)-2008 (June):

PhD (Biomathematics)

[UCLA](#)

PhD thesis: [The dynamics of transposable elements in genetically modified mosquito vectors](#)

2003 (August)-2005 (December):

MS (Biomathematics)

[UCLA](#)

2000 (February)-2002 (November):

BTech (Hons) (Optoelectronics)

[University of Auckland](#), New Zealand

1997 (February)-1999 (November):

BSc (Biological sciences)

[University of Auckland](#), New Zealand

Technical Skills and Competences

Mathematics:

- Multivariate calculus, linear algebra, vector calculus
- Ordinary and partial differential equations, reaction-diffusion systems
- Probability theory, Markov chains, branching processes
- Applications to epidemiology, molecular biology, genetics and ecology

Statistics:

- Regression, generalized linear models, maximum likelihood estimation
- Analyzing large data sets, cluster analysis
- Bayesian statistics, Markov Chain Monte Carlo methods
- Applications to epidemiology, demography and population genetics

Software and programming:

- Mathematics: Matlab, Mathematica, Berkeley Madonna
- Statistics: R, WinBUGS, ABC Toolbox
- Programming languages: C++, Python, Java

Biology:

- Molecular biology: manipulation of DNA, PCR, gel electrophoresis
- Ecology: mosquito husbandry, mark-release-recapture experiments

Social science and ethics:

- Quantitative and qualitative survey design, ethnography
- Research protocols for Institutional Review Boards

Languages:

- English (mother tongue)
- French, Bambara (African language spoken in Mali) (intermediate)
- Spanish (beginner)

Teaching

2015-2021: Lecturer, [PB HLTH 252B: Modeling the Dynamics of Infectious Disease Processes](#), UC Berkeley (Spring semester, 3 units, ~20 students)

2015-2019: Lecturer, [PB HLTH 290: Infectious Disease Modeling Seminar](#), UC Berkeley (Fall semester, 2 units, ~16 students)

2015-2016: Lecturer, [PB HLTH 145: Statistical Analysis of Continuous Outcome Data](#), UC Berkeley (Fall semester, 4 units, ~45 students)

2011-2014: Co-organizer/lecturer/demonstrator, [Short Course in Epidemiology](#), Imperial College London (Summer, professional course, ~30 students)

2009: Lecturer, Genetic Engineering in Developing Countries, UCLA (Winter quarter, 2 units, ~20 students)

2008-2010: Lecturer, Biosafety training course for Africa related to the potential release of genetically modified disease vectors, University of Bamako (Summer, professional course, ~20 students)

2005: Lecturer/demonstrator, Hidden Markov Models for Bioacoustic Analysis, UCLA (Spring quarter, 2 units, ~15 students)

Awards:

School of Public Health Committee on Teaching Excellence Award (Spring & Fall 2015, Spring & Fall 2016, Spring 2017, Spring & Fall 2018, Spring & Fall 2019, Spring 2020)

MPH students supervised (thesis advisor):

Thien-An Ha (Epidemiology & Biostatistics, 2019-2020)
Sean L. Wu (Epidemiology & Biostatistics, 2015-2016)

Jaclyn Guerrero (Epidemiology & Biostatistics, 2015-2016)

PhD students supervised (dissertation chair):

Agastya Mondal (Epidemiology, 2020-)

Váleri N. Vásquez (Energy & Resources, 2018-)

Jared B. Bennett (Biophysics, 2017-)

Sean L. Wu (Epidemiology, 2016-)

Postdocs supervised (advisor):

Dr. Sanjay Lamba (Tata Institute Fellow, 2019-)

Dr. Yogita Sharma (Innovative Genomics Institute-funded postdoc, 2018-)

Dr. Gordana Rašić (DARPA-funded postdoc, 2018-)

Dr. Tomás León (DARPA-funded postdoc, 2018-2020)

Dr. Victor Ferman (DARPA-funded postdoc, 2018-2019)

Dr. Héctor M. Sánchez C. (UC Irvine Malaria Initiative-funded postdoc, 2017-2020)

Dr. Samson S. Kiware (Wellcome Trust Fellow, 2015-2018)

Grants Awarded

Bill & Melinda Gates Foundation grant, “Modeling support for genetics-based malaria vector control strategies.” (2021-2024) Role: PI (\$800,000 award to Marshall Lab).

NIH R01 grant, “Understanding mosquito movement and its relevance to control through genetic analysis.” (2020-2024) Role: PI (\$914,356 to Marshall Lab, \$1,735,802 total).

NIH R01 grant, “Public engagement for gene drive technology.” (2020-2024) Role: Co-I (\$125,955 sub-award to Marshall Lab).

DARPA grant, “Safely engineering various classes of gene drives to control a major invasive disease vector, *Ae. aegypti*.” (2017-2021) Role: Co-PI (\$1,809,506 to Marshall Lab, \$14,949,052 total).

UC Irvine sub-contract, “UC Irvine Malaria Initiative.” (2017-2022) Role: Co-PI (\$1,029,311 sub-award to Marshall Lab).

Innovative Genomics Institute grant, “CRISPR-Cas9-based gene drive architecture for control of agricultural pests.” (2017-2020) Role: PI (\$246,000 award to Marshall Lab).

CITRIS and the Banatao Institute seed funding grant, “Machine Learning for Vector-borne Disease Surveillance.” (2019-2020) Role: PI (\$12,500 to Marshall Lab, \$25,000 total).

NIAID grant, “Measuring spillover effects of reactive, focal malaria elimination interventions.” (2019-2023) Role: Co-I (\$586,474 total).

NVIDIA GPU grant, “Statistical and machine learning methods to predict mosquito population densities.” (2018) Role: PI (\$3,000 award to Marshall Lab).

University of Washington sub-contract, “Strategic planning tools for staging malaria elimination.” (2017-2020) Role: Subaward PI (\$117,740 sub-award to Marshall Lab)

UC Berkeley sub-contract, “Effects of agricultural expansion and intensification on infectious diseases.” (2017) Role: Sub-contractor (\$12,194 sub-award to Marshall Lab).

UC Davis SVM Vector-Borne Disease Pilot Grant Program, “Working toward the eradication of *Aedes aegypti*, an invasive arbovirus vector, in California.” (2016-2017) Role: Co-I (\$25,000 total).

Bill & Melinda Gates Foundation sub-contract, "[Prototype of technology's role to facilitate surveillance needs for malaria elimination.](#)" (2015-2017) Role: Subaward PI (\$26,695 sub-award to Marshall Lab).

University of California Institute for Mexico and the United States grant, "[Determining optimal strategies for the control of vectors of dengue and other vector borne diseases in Mexico and the United States.](#)" (2015-2016) Role: PI (\$12,500 to Marshall Lab, \$25,000 total).

Sean Parker Foundation grant "[Malaria Elimination Initiative on a new vector control for malaria elimination.](#)" (2015-2016) Role: Subaward PI (\$80,832 sub-award to Marshall Lab).

UC Davis Signature Research in Genomics Program Award, "[Advanced genomic tools for estimating dispersal of African malaria vectors.](#)" (2015-2016) Role: Co-I (\$45,000 total).

UK Medical Research Council grant, "[Optimal trial design for a confined release of malaria-refractory transgenic mosquitoes.](#)" (2012-2015) Role: PI (£285,103 award to Marshall Lab).

Peer-reviewed Publications

1. Wills P, **Marshall JM**, Smith P (2004) [Genetic information and self-organised criticality](#). Europhysics Letters 68: 901-907.
2. **Marshall JM**, Weiss R (2006) [A Bayesian heterogeneous analysis of variance approach to inferring recent selective sweeps](#). Genetics 173: 2357-2370.
3. **Marshall JM**, Morikawa K, Manoukis N, Taylor CE (2007) [Predicting the effectiveness of population replacement strategy using mathematical modeling](#). J. Vis. Exp. 5: 227.
4. **Marshall JM** (2008) [The impact of dissociation on transposon-mediated disease control strategies](#). Genetics 178: 1673-1682.
5. **Marshall JM** (2008) [A branching process model for the early spread of a transposable element in a diploid population](#). J. Math. Biol. 57: 811-840.
6. **Marshall JM** (2009) [The effect of gene drive on containment of transgenic mosquitoes](#). J. Theor. Biol. 258: 250-265.
7. **Marshall JM**, Taylor CE (2009) [Malaria control with transgenic mosquitoes](#). PLoS Medicine 6: e1000020.
8. **Marshall JM**, Touré MB, Traore MM, Taylor CE (2010) [Towards a quantitative assessment of public attitudes to transgenic mosquitoes: Questions based on a qualitative survey in Mali](#). AsPac. J. Mol. Biol. Biotechnol. 18: 251-273.
9. **Marshall JM**, Toure MB, Traore MM, Famenini S, Taylor CE (2010) [Perspectives of people in Mali toward genetically modified mosquitoes for malaria control](#). Malar. J 9: 128.
10. **Marshall JM** (2010) [The Cartagena Protocol and genetically modified mosquitoes](#). Nat. Biotech. 28: 896-897.
11. **Marshall JM** (2011) [The Cartagena Protocol in the context of recent releases of transgenic and *Wolbachia*-infected mosquitoes](#). AsPac. J. Mol. Biol. Biotechnol. 19: 93-100.
12. **Marshall JM** (2011) [The toxin and antidote puzzle: New ways to control insect pest populations through manipulating inheritance](#). Bioeng. Bugs. 2: 1-6.

13. **Marshall JM**, Hay BA (2011) [Inverse *Medea* as a novel gene drive system for local population replacement: A theoretical analysis](#). J. Hered. 102: 336-341.
14. **Marshall JM**, Pittman GW, Buchman AB, Hay BA (2011) [Semele: A killer-male, rescue-female system for suppression and replacement of insect disease vector populations](#). Genetics 187: 535-551.
15. Akbari OS*, Chen CH*, **Marshall JM***, Huang H, Antoshechkin I, Hay BA (2012) [Novel synthetic *Medea* selfish genetic elements drive population replacement in *Drosophila*: a theoretical exploration of *Medea*-dependent population suppression](#). ACS Synth. Biol. 3: 915-928. *Equal contribution
16. De Silva P, **Marshall JM** (2012) [Factors contributing to urban malaria transmission in sub-Saharan Africa: A systematic review](#). J. Trop. Med. 2012: 819563.
17. **Marshall JM**, Hay BA (2012) [General principles of single-construct chromosomal gene drive](#). Evolution. 66: 2150-2166.
18. **Marshall JM**, Hay BA (2012) [Confinement of gene drive systems to local populations: A comparative analysis](#). J. Theor. Biol. 294: 153-171.
19. Gattton ML, Chitnis N, Churcher T, Donnelly MJ, Ghani AC, Godfray HCJ, Gould F, Hastings I, **Marshall JM**, Ranson H, Rowland M, Shaman J, Lindsay SW (2013) [The importance of mosquito behavioral adaptations to malaria control in Africa](#). Evolution 67: 1218-1230.
20. Akbari OS*, Matzen KD*, **Marshall JM***, Huang H, Ward CM, Hay BA (2013) [A synthetic gene drive system for local, reversible modification and suppression of insect populations](#). Curr. Biol. 23: 671-677. *Equal contribution
21. **Marshall JM**, White MT, Ghani AC, Schlein Y, Muller GC, Beier JC (2013) [Quantifying the mosquito's sweet tooth: Modelling the effectiveness of attractive toxic sugar baits \(ATSB\) for malaria vector control](#). Malar. J. 12: 291.
22. White MT, Lwetoijera D, **Marshall JM**, Caron-Lormier G, Bohan DA, Denholm I, Devine GJ (2014) [Negative cross resistance mediated by co-treated bed nets: A potential means of restoring pyrethroid-susceptibility to malaria vectors](#). PLoS ONE 9: e95640.
23. Okorie PN, **Marshall JM**, Akpa MO, George AO (2014) [Perceptions and recommendations by scientists for a potential release of genetically modified mosquitoes in Nigeria](#). Malar. J. 13: 154.
24. **Marshall JM**, Hay BA (2014) [Medusa: A novel gene drive system for confined suppression of mosquito populations](#). PLoS ONE 9: e102694.
25. Zhu L, Qualls WA, **Marshall JM**, Arheart KL, DeAngelis DL, McManus JW, Traore SF, Doumbia S, Schlein Y, Müller GC, Beier JC (2015) [A spatial individual-based model predicting a great impact of copious sugar sources and resting sites on survival of *Anopheles gambiae* and malaria parasite transmission](#). Malar. J. 14: 59.
26. Zhu L, **Marshall JM**, Qualls WA, Schlein Y, McManus JW, Arheart KL, Hlaing WM, Traore SF, Doumbia S, Müller GC, Beier JC (2015) [Modelling optimum use of attractive toxic sugar bait stations for effective malaria vector control in Africa](#). Malar. J. 14: 492.
27. Cheng Q, Jing Q, Spear RC, **Marshall JM**, Yang Z, Gong P (2016) [Climate and timing of imported cases as determinants of the dengue outbreak in Guangzhou](#).

[2014: Evidence from a mathematical model](#). PLoS NTDs 10: e0004417.

28. **Marshall JM**, Touré MB, Ouédraogo AL, Ndhlovu M, Kiware SS, Rezai A, Nkhama E, Griffin JT, Hollingsworth TD, Doumbia S, Govella NJ, Ferguson NM, Ghani AC (2016) [Key traveller groups of relevance to spatial malaria transmission: A survey of movement patterns in four sub-Saharan African countries](#). Malar. J. 15: 200.

29. **Marshall JM**, Bennett A, Kiware SS, Sturrock HJW (2016) [The hitchhiking parasite: Why human movement matters to malaria transmission and what we can do about it](#). Trends Parasitol. 32: 752–755.

30. Killeen GF, Kiware SS, Okumu FO, Sinka ME, Moyes CL, Massey NC, Gething PW, **Marshall JM**, Chaccour CJ, Tusting LS (2017) [Going beyond personal protection against mosquito bites to eliminate malaria transmission: population suppression of malaria vectors that exploit both human and animal blood](#). BMJ Global Health 2: e000198.

31. Killeen GF, Tatarsky A, Diabate A, Chaccour CJ, **Marshall JM**, Okumu FO, Brunner S, Newby G, Williams YA, Malone D, Tusting LS, Gosling RD (2017) [Developing an expanded vector control toolbox for malaria elimination](#). BMJ Global Health 2: e000211.

32. Killeen GF, **Marshall JM**, Kiware SS, Andy S, Chaki PP, Govella NJ (2017) [Measuring, manipulating and exploiting behaviors of adult mosquitoes to optimize malaria vector control impact](#). BMJ Global Health 2: e000212.

33. **Marshall JM**, Buchman B, Sanchez HM, Akbari OS (2017) [Overcoming evolved resistance to population-suppressing homing-based gene drives](#). Nature Scientific Reports 7: 3776.

34. Cheng Q, Jing Q, Spear RC, **Marshall JM**, Yang Z, Gong P (2017) [The interplay of climate, intervention and imported cases in determining the potential and final epidemic size of dengue outbreak in Guangzhou](#). PLoS NTDs 11: e0005701.

35. Zhu L, Muller GC, **Marshall JM**, Arheart KL, Qualls WA, Hlaing WM, Schlein Y, Traore SF, Doumbia S, Beier JC (2017) [Is outdoor vector control needed for malaria elimination? An individual-based modelling study](#). Malaria Journal 16: 266.

36. Adelman Z, Akbari O, Bauer J, Bier E, Bloss C, Carter SR, Callender C, Costero-Saint Denis A, Cowhey P, Dass B, Delborne J, Devereaux M, Ellsworth P, Friedman RM, Gantz V, Hay BA, Hoddle M, James AA, James S, Jorgenson L, Kalichman M, **Marshall JM**, McGinnis W, Newman J, Pearson A, Quemada H, Rudenko L, Shelton A, Vinetz JM, Weisman J, Wong B, Wozniak C (2017) [Rules of the road for insect gene drive research and testing](#). Nat. Biotech. 35: 716-718.

37. Kiware SS, Chitnis N, Tatarsky A, Wu SL, Sanchez HM, Gosling R, Smith DL, **Marshall JM** (2017) [Attacking the mosquito on multiple fronts: Insights from the Vector Control Optimization Model \(VCOM\) for malaria elimination](#). PLoS ONE 12: e0187680.

38. Benedict MQ, Bier E, Burt A, Capurro ML, De Barro P, Handler AM, Hayes KR, **Marshall JM**, Tabachnick WJ, Adelman ZN (2018) [Recommendations for laboratory containment and management of gene drive systems in arthropods](#). Vector Borne Zoonotic Dis 18: 2-13.

39. **Marshall JM**, Akbari OS (2018) [Can CRISPR-based gene drive be confined in the wild? A question for molecular and population biology](#). ACS Chemical Biology 13: 424-430.

40. Buchman A, Ivy T, **Marshall JM**, Akbari OS, Hay BA (2018) [Engineered reciprocal chromosome translocations drive high threshold, reversible population replacement in *Drosophila*](#). ACS Synthetic Biology 7: 1359-1370.
41. Buchman A, **Marshall JM**, Ostrovski D, Yang T, Akbari OS (2018) [Synthetically engineered *Medea* gene drive system in the worldwide crop pest *D. suzukii*](#). Proc Natl Acad Sci USA 115: 4725-4730.
42. Jing QL, Cheng Q, **Marshall JM**, Hu WB, Yang ZC, Lu JH (2018) [Imported cases and minimum temperature drive dengue transmission in Guangzhou, China: Evidence from an ARIMAX model](#). Epidemiology & Infection 146: 1226-1235.
43. **Marshall JM**, Wu SL, Sánchez HM, Kiware SS, Ndhlovu M, Ouédraogo AL, Touré MB, Sturrock HJ, Ghani AC, Ferguson NM (2018) [Mathematical models of human mobility of relevance to malaria transmission in Africa](#). Nature Scientific Reports 8: 7713.
44. KaramiNejadRanjbar M, Eckermann KN, Ahmed HMM, Sánchez HM, Dippel S, **Marshall JM**, Wimmer EA (2018) [Consequences of resistance evolution in a Cas9-based sex-conversion suppression gene drive for insect pest management](#). Proceedings of the National Academy of Sciences USA 115: 6189-6194.
45. Arakala A, Hoover CM, **Marshall JM**, Sokolow SH, De Leo GA, Rohr JR, Remais JV, Gambhir M (2018) [Estimating the elimination feasibility in the “end game” of control efforts for parasites subjected to regular mass drug administration: Methods and their application to schistosomiasis](#). PLoS Neglected Tropical Diseases 12: e0006794.
46. Kandul NP, Liu J, Sánchez HM, Wu SL, **Marshall JM**, Akbari OS (2019) [Transforming insect population control with precision guided sterile males](#). Nature Communications 10: 84.
47. Lee Y, Schmidt H, Collier TC, Conner WR, Hanemaaijer MJ, Slatkin M, **Marshall JM**, Chiu JC, Smartt CT, Lanzaro GC, Mulligan FS, Cornel AJ (2019) [Genome-wide divergence among invasive populations of *Aedes aegypti* in California](#). BMC Genomics 20: 204.
48. Kandul NP, Liu J, Sánchez HM, Wu SL, **Marshall JM**, Akbari OS (2019) [Reply to ‘Concerns about the feasibility of using “precision guided sterile males” to control insects’](#). Nature Communications 10: 3955.
49. Sánchez HM, Wu SL, Bennett JB, **Marshall JM** (2019) [MGDrivE: A modular simulation framework for the spread of gene drives through spatially-explicit mosquito populations](#). Methods in Ecology and Evolution doi: <https://doi.org/10.1111/2041-210X.13318>.
50. **Marshall JM**, Raban R, Kandul NP, Edula JR, León T, Akbari OS (2019) [Winning the tug-of-war between effector gene design and pathogen evolution in vector population replacement strategies](#). Frontiers in Genetics 10: 1072.
51. Zhang Z, Jing Q, Chen Z, Li T, Jiang L, Li Y, Luo L, **Marshall JM**, Yang Z (2019) [The increasing menace of dengue in Guangzhou, 2001–2016: The most important epicenter in mainland China](#). BMC Infectious Diseases 19: 1002.
52. Pham TB, Phong CH, Bennett JB, Hwang K, Jasinskiene N, Parker K, Stillinger D, **Marshall JM**, Carballar-Lejarazú R, James AA (2019) [Experimental population modification of the malaria vector mosquito, *Anopheles stephensi*](#). PLoS Genetics 15: e1008440.
53. López VD, Bishop AL, Sánchez HM, Bennett JB, Feng X, **Marshall JM**, Bier E, Gantz VM (2020) [A transcomplementing gene drive provides a flexible platform](#)

[for laboratory investigation and potential field deployment](#). Nature Communications 11: 352.

54. Li M, Yang T, Kandul NP, Bui M, Gamez S, Raban R, Bennett JB, Sánchez HM, Lanzaro GC, Schmidt H, Lee Y, **Marshall JM**, Akbari OS (2020) [Development of a confinable gene-drive system in the human disease vector, *Aedes aegypti*](#). eLife 9: e51701.

55. Raban RR, **Marshall JM**, Akbari OS (2020) [Progress toward engineering gene drives for population control](#). Journal of Experimental Biology 223: jeb208181.

56. Friedman RM, **Marshall JM**, Akbari OS (2020) [Gene drives: New and improved](#). Issues in Science and Technology 36: 72-78.

57. James SL, **Marshall JM**, Christophides GK, Okumu FO, Nolan T (2020) [Toward the definition of efficacy and safety criteria for advancing gene drive-modified mosquitoes to field testing](#). Vector-Borne and Zoonotic Diseases doi: <https://doi.org/10.1089/vbz.2019.2606>.

58. Wu SL, Sánchez HM, Henry JM, Citron DT, Zhang Q, Compton KE, Liang B, Verma A, Cummings DAT, Le Menach A, Scott TW, Wilson AL, Lindsay SW, Moyes CL, Hancock PA, Russell TL, Burkot TR, **Marshall JM**, Kiware S, Reiner RC, Smith DL (2020) [Vector bionomics and vectorial capacity as emergent properties of mosquito behaviors and ecology](#). PLoS Computational Biology 16: e1007446.

59. Sánchez HM, Bennett JB, Wu SL, Rašić G, Akbari OS, **Marshall JM** (2020) [Confinement and reversibility of threshold-dependent gene drive systems in spatially-explicit *Aedes aegypti* populations](#). BMC Biology 18: 50.

60. Cheung C, Gamez S, Carballar-Lejarazú R, Ferman V, Vásquez VN, Terradas G, Ishikawa J, Schairer CE, Bier E, **Marshall JM**, James AA, Akbari OS, Bloss CS (2020) [Translating gene drive science to promote linguistic diversity in community and stakeholder engagement](#). Global Public Health doi: <https://doi.org/10.1080/17441692.2020.1779328>.

61. Xu XS, Bulger EA, Gantz VM, Klanseck C, Heimler SR, Auradkar A, Bennett JB, Miller LA, Leahy S, Juste SS, Buchman A, Akbari OS, **Marshall JM**, Bier E (2020) [Active genetic neutralizing elements for halting or deleting gene drives](#). Molecular Cell 80: 246-262.

62. Adolfi A, Gantz VM, Jasinskiene N, Lee HF, Hwang K, Bulger EA, Ramaiah A, Bennett JB, Terradas G, Emerson JJ, **Marshall JM**, Bier E, James AA (2020) [Efficient population modification gene-drive rescue system in the malaria mosquito *Anopheles stephensi*](#). Nature Communications 11: 5553.

63. Long KC, Alphey L, Annas GJ, Bloss CS, Campbell KJ, Champer J, Chen CH, Choudhary A, Church GM, Collins JP, Cooper KL, Delborne JA, Edwards OR, Emerson CI, Esvelt K, Evans SW, Friedman RM, Gantz VM, Gould F, Hartley S, Heitman E, Hemingway J, Kanuka H, Kuzma J, Lavery JV, Lee Y, Lorenzen M, Lunshof JE, **Marshall JM**, Messer PW, Montell C, Oye KA, Palmer MJ, Pappathanos PA, Paradkar PN, Piaggio AJ, Rasgon JL, Rašić G, Rudenko L, Saah JR, Scott MJ, Sutton JT, Vorsino AE, Akbari OS (2020) [Core commitments for field trials of gene drive organisms](#). Science 370: 1417-1419.

64. Kormos A, Lanzaro GC, Bier E, Dimopoulos G, **Marshall JM**, Pinto J, dos Santos AA, Bacar A, Sacramento Rompão HSP, James AA (2020) [Application of the relationship-based model to engagement for field trials of genetically engineered malaria vectors](#). American Journal of Tropical Medicine and Hygiene doi: <https://doi.org/10.4269/ajtmh.20-0868>.

65. Jing QL, Wu SL, He Z, Yuan L, Ma M, Bai Z, Jiang L, **Marshall JM**, Lu J, Yang Z (2021) [New genotype invasion of dengue virus serotype 1 drove massive outbreak in Guangzhou, China](#). *Parasites & Vectors* 14: 126.
66. Kandul NP, Liu J, Bennett JB, **Marshall JM**, Akbari OS (2021) [A home and rescue gene drive forces its inheritance stably persisting in populations](#). *eLife* 10: e65939.
67. Terradas G, Buchman AB, Bennett JB, Shriner I, **Marshall JM**, Akbari OS, Bier E (2021) [Inherently confinable split-drive systems in *Drosophila*](#). *Nature Communications* 12: 1480.
68. Rerolle F, Dantzer E, Lover AA, **Marshall JM**, Hongvanthong B, Sturrock HJW, Bennett A (2021) [Spatio-temporal associations between deforestation and malaria incidence in Lao PDR](#). *eLife* 10: e56974.
69. Fraser KJ, Mwandigha L, Traore S, Traore M, Doumbia S, Junnila A, Revay E, Beier J, **Marshall JM**, Ghani AC, Muller G (2021) [Estimating the potential of Attractive Targeted Sugar Baits \(ATSBs\) as a new vector control tool for *Plasmodium falciparum* malaria](#). *Malaria Journal* 20: 151.

Book Chapters

1. **Marshall JM**, Akbari OS (2015) [Gene drive systems in mosquitoes](#). In: Adelman ZN (editor) [Genetic Control of Dengue and Malaria](#). Elsevier/Academic Press, New York.
2. **Marshall JM** (2015) [Measuring public attitudes to releases of transgenic mosquitoes for disease control](#). In: Tyagi BK (editor) [WHO/TDR Training Manual: Biosafety for Human Health and the Environment in the Context of the Potential Use of Genetically Modified Mosquitoes](#). WHO Press, Geneva.
3. **Marshall JM** (2015) [The Cartagena Protocol and releases of transgenic mosquitoes](#). In: Tyagi BK (editor) [WHO/TDR Training Manual: Biosafety for Human Health and the Environment in the Context of the Potential Use of Genetically Modified Mosquitoes](#). WHO Press, Geneva.

Pre-prints

1. Sánchez HM, **Marshall JM**, Wu SL, Vallejo EE (2017) [Effects of spatial heterogeneity on transmission potential in vectorial-contact networks: A comparison of three *Aedes aegypti* control strategies](#). bioRxiv doi: <https://doi.org/10.1101/210450>.
2. Buchman A, Shriner I, Yang T, Liu J, Antoshechkin I, **Marshall JM**, Perry MW, Akbari OS (2020) [Engineered reproductively isolated species drive reversible population replacement](#). bioRxiv doi: <https://www.biorxiv.org/content/10.1101/2020.08.09.242982v1>.
3. Hossain MP, Zhou W, Ren C, **Marshall JM**, Yuan HY (2020) [Determining the effects of preseasonal climate factors toward dengue early warning system in Bangladesh](#). bioRxiv doi: <https://doi.org/10.1101/2020.09.21.20199190>.
4. Wu SL, Bennett JB, Sánchez HM, Dolgert AJ, León TM, **Marshall JM** (2020) [MGDrivE 2: A simulation framework for gene drive systems incorporating seasonality and epidemiological dynamics](#). bioRxiv doi: <https://doi.org/10.1101/2020.10.16.343376>.
5. Ha T, León TM, Lalangui K, Ponce P, **Marshall JM**, Cevallos V (2020) Household-level risk factors for *Aedes aegypti* pupal density in Guayaquil, Ecuador. bioRxiv doi: <https://doi.org/10.1101/2020.11.23.391938>.
6. Wu SL, Dolgert AJ, Lewnard JA, **Marshall JM**, Smith DL (2020) Principled

simulation of agent-based models in epidemiology. bioRxiv doi:
<https://doi.org/10.1101/2020.12.21.423765>.

7. Rerolle F, Jacobson JO, Wesson P, Dantzer E, Lover AA, Hongvanthong B, Smith J, **Marshall JM**, Sturrock HJW, Bennett A (2021) Population size estimation of seasonal forest-going populations in Southern Lao PDR. Research Square doi:
<https://doi.org/10.21203/rs.3.rs-358978/v1>.

8. Li M, Yang T, Bui M, Gamez S, Wise T, Kandul NP, Liu J, Alcantara L, Lee H, Edula JR, Raban R, Zhan Y, Wang Y, DeBeaubien N, Chan J, Sanchez HM, Bennett JB, Antoshechkin I, Montell C, **Marshall JM**, Akbari OS (2021) Eliminating mosquitoes with precision guided sterile males. bioRxiv doi:
<https://doi.org/10.1101/2021.03.05.434167>.

Scientific Meetings and Invited Presentations

Marshall JM (2005) [The dynamics of transposable elements in genetically modified mosquito vectors](#). Contributed talk at the Institute for Pure and Applied Mathematics Biophysical Modeling Workshop, Los Angeles, California.

Marshall JM, Weiss R (2005) [A Bayesian approach to inferring recent selective sweeps in *Anopheles gambiae* populations](#). Contributed talk at the 2nd International Meeting on Molecular and Population Biology of Mosquitoes and Other Disease Vectors, Kolymbari, Greece.

Marshall JM (2006) [Successful conditions for the early spread of a transposable element in a disease vector population](#). Contributed talk at the 55th Annual Meeting of the American Society for Tropical Medicine and Hygiene, Atlanta, Georgia.

Marshall JM (2007) [The impact of dissociation on transposon-mediated disease control strategies](#). Contributed talk at:

- the 3rd International Meeting on Molecular and Population Biology of Mosquitoes and Other Disease Vectors, Kolymbari, Greece,
- the 56th Annual Meeting of the American Society for Tropical Medicine and Hygiene, Philadelphia, Pennsylvania,
- the Workshop for Young Researchers in Mathematical Biology, Columbus, Ohio, and
- the 76th Annual Conference of the Mosquito and Vector Control Association of California, Palm Springs, California.

Marshall JM (2008) [Modelling the potential outcomes of releasing GM mosquito vectors](#). Contributed talk at:

- the Malaria Research and Training Center, Bamako, Mali,
- the Department of Mathematics, University of Bamako, Bamako, Mali, and
- the 57th Annual Meeting of the American Society for Tropical Medicine and Hygiene, New Orleans, Louisiana.

Marshall JM (2009) [Can mosquitoes engineered with gene drive systems be contained?](#) Contributed talk at the 58th Annual Meeting of the American Society for Tropical Medicine and Hygiene, Washington, DC.

Marshall JM, Touré MB, Traore MM, Taylor CE (2009) [Perspectives of people in Mali, West Africa toward genetically modified mosquitoes for malaria control](#).

Contributed talk at:

- the Center for Society and Genetics, UCLA, Los Angeles, California
- the Malaria Research and Training Center, Bamako, Mali,
- the 4th International Meeting on Molecular and Population Biology of Mosquitoes and Other Disease Vectors, Kolymbari, Greece, and
- the 58th Annual Meeting of the American Society for Tropical Medicine and Hygiene, Washington, DC.

Marshall JM (2009) [Releasing GM mosquitoes: Insights from mathematics and Malians](#). Invited talk at:

- the Department of Infectious Disease Epidemiology, Imperial College, London, England, and
- the Division of Biology, California Institute of Technology, Pasadena, California.

Marshall JM, Hay BA (2010) [General principles and novel possibilities for single-construct gene drive](#). Contributed talk at the 59th Annual Meeting of the American Society for Tropical Medicine and Hygiene, Atlanta, Georgia.

Marshall JM (2010) [The Cartagena Protocol and genetically modified mosquitoes](#). Contributed poster at the 59th Annual Meeting of the American Society for Tropical Medicine and Hygiene, Atlanta, Georgia.

Marshall JM (2011) [The Cartagena Protocol in the context of transgenic and Wolbachia-infected mosquitoes](#). Contributed talk at the 60th Annual Meeting of the American Society for Tropical Medicine and Hygiene, Philadelphia, Pennsylvania.

Marshall JM (2011) [Malaria and human movement: Beyond Newton's theory of gravity](#). Invited talk at the Department of Infectious Disease Epidemiology, London School of Hygiene and Tropical Medicine, London, England.

Marshall JM (2011) [The toxin and antidote puzzle: New ways to control insect pest populations through manipulating inheritance](#). Contributed talk at:

- the Department of Biological Sciences, Imperial College London, London, England, and
- the 5th International Meeting on Molecular and Population Biology of Mosquitoes and Other Disease Vectors, Kolymbari, Greece.

Marshall JM (2011) [Genetic engineering of local populations](#). Invited talk at the Department of Biological Sciences, Stanford University, Stanford, California.

Marshall JM, White MT, Ghani AC, Schlein Y, Muller GC, Beier JC (2012) [Quantifying the mosquito's sweet tooth: Modelling the effectiveness of attractive toxic sugar baits for vector control](#). Contributed talk at:

- the Malaria Centre, Imperial College London, London, England,
- the 61st Annual Meeting of the American Society for Tropical Medicine and Hygiene, Atlanta, Georgia, and
- the 6th International Meeting on Molecular and Population Biology of Mosquitoes and Other Disease Vectors, Kolymbari, Greece.

Marshall JM, Hay BA (2012) [Medusa: A novel gene drive system for confined suppression of mosquito populations](#). Contributed talk at:

- the Malaria Centre, Imperial College London, London, England, and
- the 61st Annual Meeting of the American Society for Tropical Medicine and Hygiene, Atlanta, Georgia.

Marshall JM (2012) [If Mother Teresa was a Genetic Engineer](#). Invited talk at [TEDx LA Miracle Mile](#), Los Angeles, California.

Marshall JM (2013) [What role should mathematical models and transgenic mosquitoes play in dengue control programs in India?](#) Invited talk at Brain Storming Conference on Dengue Scenario in India: Disease Burden, Surveillance and Control, Madurai, India.

Marshall JM (2013) [If Mother Teresa was a genetic engineer: From golden rice to GM mosquitoes for malaria control](#). Invited talk at University College London, London, England.

Marshall JM, Touré MB, Ouédraogo AL, Ndhlovu M, Kiware SS, Rezai S, Nkhama E, Griffin JT, Hollingsworth TD, Doumbia S, Govella NJ, Ferguson NM, Ghani AC (2014) [Contributions of women with children and youth workers to spatial malaria transmission in sub-Saharan Africa](#). Contributed talk/poster at:

- the MRC Centre for Outbreak Analysis and Modeling, Imperial College London, London, England, and
- the 63rd Annual Meeting of the American Society for Tropical Medicine and Hygiene, New Orleans, Louisiana.

Marshall JM (2014) [Predicting the utility of novel strategies for vector-borne disease control using mathematical models](#). Invited talk at:

- the Division of Biostatistics, University of California, Berkeley, California, and
- the Department of Medicine, University of California, San Francisco, California.

Marshall JM, Bennett A, Midekisa A, Gosling R, Sturrock HJW (2015) [From risk maps to decision maps for malaria elimination](#). Contributed poster at the 64th Annual Meeting of the American Society for Tropical Medicine and Hygiene, Philadelphia, Pennsylvania.

Marshall JM (2015) [Mathematical modeling in a new era of malaria elimination](#).

Invited talk at:

- the Department of Entomology, University of Maryland, College Park, Maryland, and
- the [Bay Area World Malaria Day Symposium](#), University of California, Berkeley, California.

Marshall JM (2015) [The current global policy situation regarding GM insects for disease control](#). Invited talk at the House of Lords, London, England.

Marshall JM (2016) [Overcoming evolved resistance to population-suppressing homing-based gene drives](#). Contributed poster at the 65th Annual Meeting of the American Society for Tropical Medicine and Hygiene, Atlanta, Georgia.

Marshall JM (2016) [Designing disease control strategies using models and data from multiple sources](#). Invited talk at the ENAR 2016 Spring Meeting, Austin, Texas.

Marshall JM (2016) [Zika virus: Insights from mathematical models](#). Invited talk at the Preparedness for Zika Virus Symposium, University of California, San Francisco, California.

Marshall JM (2017) [Parameter estimation in infectious disease epidemiology: Do you have any better ideas?](#) Invited talk at the Workshop in Biostatistics, Department of Biomedical Data Science, Stanford University, Stanford, California.

Marshall JM (2017) [Gene drive: What is possible at the population level with currently-available molecular components?](#) Invited talk at:

- the Lorentz Center workshop on “Challenges for the Regulation of Gene Drive Technology”, Leiden, the Netherlands,
- the 25th International Congress of Entomology, Orlando, Florida,
- the Statistics and Genomics Seminar, Division of Biostatistics, University of California, Berkeley, California,
- the Department of Medicine, University of California, San Francisco, California,
- the Joint Genome Institute, Walnut Creek, California, and
- Henry Stewart Talks on “Gene Drives and Active Genetics”, <https://hstalks.com/t/3764/gene-drive-what-is-possible-at-the-population->

[leve/](#).

Marshall JM (2017) [Gene drive: Modeling replacement, suppression and remediation in quantified ecosystems](#). Invited talk at the LAVIPAC workshop on “Innovative Vector Control Strategies in the Pacific”, Moorea, French Polynesia.

Marshall JM (2017) [Why has dengue resurged, why does malaria persist, and can these diseases be controlled by CRISPR-based gene drive and other novel tools?](#)

Invited talk at:

- the Guangzhou Center for Disease Control and Prevention, Guangdong, China, and
- the National Health Research Institutes, Zhunan, Taiwan.

Marshall JM (2018) [Can malaria, dengue and Zika be controlled by CRISPR-based gene drive and other novel tools?](#) Invited talk at:

- the Harvard Medical School, Harvard University, Boston, Massachusetts,
- the Department of Biological Sciences, University of Notre Dame, Notre Dame, Indiana,
- the Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California, and
- the QIMR Berghofer Medical Research Institute, Brisbane, Australia.

Marshall JM (2018) [Designing safe strategies to eliminate malaria using gene editing](#). Invited talk at:

- the Bay Area World Malaria Day Symposium, Zuckerberg San Francisco General Hospital, San Francisco, California, and
- the [School of Public Health 75th Anniversary Research Showcase](#), University of California, Berkeley, California.

Marshall JM (2018) [CRISPR-Cas9-based gene drive architecture for control of agricultural pests](#). Invited talk at the Plant Genome Engineering Symposium, University of California, Berkeley, California.

Sánchez HM, Wu SL, Bennett JB, **Marshall JM** (2018) [MGDrive: A simulation framework for gene drive in spatially-explicit mosquito populations and its application to threshold-dependent systems](#). Invited talk/poster at:

- the Annual Meeting of the Society for Mathematical Biology, Sydney, Australia,
- the 67th Annual Meeting of the American Society for Tropical Medicine and Hygiene, New Orleans, Louisiana, and
- the Annual Meeting of the Entomological Society of America, Vancouver, Canada.

Marshall JM (2018) [Fighting mosquito-borne diseases with genomics, machine learning and likelihood functions](#). Invited talk at:

- the School of Public Health, University of California, Berkeley, California,
- the Chan Zuckerberg Biohub, San Francisco, California, and
- Verily Life Sciences, South San Francisco, California.

Marshall JM (2019) [Can malaria, dengue and Zika be controlled by a CRISPR-based gene drive? Insights from mathematical models](#). Invited talk at:

- the Innovative Genomics Institute, Berkeley, California,
- the School of Public Health, University of California, Berkeley, California,
- the David Geffen School of Medicine, University of California, Los Angeles, California,
- Cal Day 2019, University of California, Berkeley, California,
- the Arthropod-borne Diseases in the Age of Quantitative Biology Symposium, Gladstone Institutes, San Francisco, California, and

- INSPI (Instituto Nacional de Investigación en Salud Pública), Quito, Ecuador.

Vasquez VN, **Marshall JM** (2019) [Informing risk assessment with the Mosquito Gene Drive Explorer \(MGDrivE\)](#). Invited talk at the Gene Drive Modeling Conference, ILSI Research Foundation, Washington, DC.

Marshall JM (2019) [Data sharing in gene drive research: Experiences of a mathematical modeler](#). Invited talk at the Gene Drive Research Forum, African Union, Addis Ababa, Ethiopia.

Marshall JM, Sánchez HM, Bennett JB, Wu, SL, León TM, Rašić G, Akbari OS (2020) [Modeling novel genetic control strategies for *Aedes aegypti* disease vectors](#). Contributed talk at the 69th Annual Meeting of the American Society for Tropical Medicine and Hygiene (virtual).

Marshall JM (2021) [Current status of genetic strategies for mosquito-borne disease control](#). Invited talk at the School of Public Health, University of California, Berkeley, California (virtual).

Memberships

2016-current: American Society for Tropical Medicine and Hygiene (ASTMH)

Professional Service

Reviewer for:

Science; Nature Biotechnology; Nature Communications; Proceedings of the National Academy of Sciences USA; Lancet Infectious Diseases; eLife; PLoS Computational Biology; PLoS ONE; Journal of Theoretical Biology; Journal of the Royal Society Interface; Proceedings of the Royal Society B; Malaria Journal; American Journal of Tropical Medicine and Hygiene; BMC Biology; Mathematical Biosciences; Acta Tropica; BioSystems; Journal of Computational Science; Transactions of the Royal Society of Tropical Medicine and Hygiene; Infection, Genetics and Evolution; Electronic Journal of Biotechnology; Asia-Pacific Journal of Molecular Biology and Biotechnology; British Journal of Medicine and Medical Research; Evolutionary Applications

Grant reviewer for:

European Research Council, UK Medical Research Council, NordForsk, France Berkeley Fund

Expert advisor for:

US National Academy of Sciences, The Cartagena Protocol on Biosafety to the Convention on Biological Diversity, Ad Hoc Technical Expert Group on Synthetic Biology to the Convention on Biological Diversity, Médecins Sans Frontières

Referees

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