

CHRISTIAN E. GUNNING

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EDUCATION

University of New Mexico, Albuquerque *Summer 2014*
Ph.D. with Distinction in Biology (Disease Ecology with concentration in Integrative Biology)
Committee: Drs. Helen J. Wearing (advisor), James H. Brown, Melanie Moses, and Erik Erhardt
Title: Population and metapopulation ecology of childhood diseases in the pre-vaccine era United States

University of New Mexico, Albuquerque *Fall 2009*
Masters of Water Resources (Riparian Hydroecology)
Advisors: Drs. Bruce Thomson and Roy Jemison
Title: Estimating phreatophyte evapotranspiration from diel groundwater fluctuations in the Middle Rio Grande Bosque

University of Georgia, Athens *Fall 2001*
Bachelor of Science, Biochemistry and Molecular Biology
Advisor: Dr. James Omichinski

PEER-REVIEWED PUBLICATIONS

Full list available at <https://scholar.google.com/citations?user=y355pzMAAAAJ>

Mentee co-author: †

Co-first author: *

C.E. Gunning, P. Rohani, L. Mwananyanda, G. Kwenda, Z. Mupila, C.J. Gill. Young Zambian infants with symptomatic RSV and pertussis infections are frequently prescribed inappropriate antibiotics: a retrospective analysis (2023). *PeerJ*.

C.E. Gunning, A. Morrison, K. Okamoto, T.W. Scott, H. Astete, F. Gould, A.L. Lloyd. A critical assessment of the detailed *Aedes aegypti* simulation model Skeeter Buster 2 using field experiments of indoor insecticidal control in Iquitos, Peru (2022). *PLOS Neglected Tropical Diseases*.

J. Baltzegar, M. Vella[†], C.E. Gunning, G. Vasquez, H. Astete, F. Stell, M. Fisher, T.W. Scott, A. Lenhart, A.L. Lloyd, A. Morrison, F. Gould (2021). *Evolutionary Applications*.

C.J. Gill, C.E. Gunning*, W.B. MacLeod, L. Mwananyanda, D.M. Thea, R.C. Pieciak, G. Kwenda, Z. Mupila, P. Rohani (2021). Asymptomatic *Bordetella pertussis* infections in a longitudinal cohort of young African infants and their mothers. *eLife*.

R.K. Borchering, C.E. Gunning, Deven V Gokhale[†], K.B. Weedop, A. Saeidpour, T.S. Brett, P. Rohani (2021). Anomalous influenza seasonality in the United States and the emergence of novel influenza B viruses. *Proceedings of the National Academy of Sciences*.

C.E. Gunning, L. Mwananyanda, W.M. MacLeod, M. Mwale, D. Thea, R.C. Pieciak, P. Rohani, C. Gill (2020) Implementation and adherence of routine pertussis vaccination (DTP) in a low-resource urban birth cohort. *BMJ-Open*.

E.M. Schultz, C.E. Gunning, J.M. Cornelius, D.G. Reichard, K.C. Klasing, T.P. Hahn (2020). Patterns of annual and seasonal immune investment in a temporal reproductive opportunist. *Proceedings of the Royal Society B*.

- C.E. Gunning, K. Okamoto, H. Astete, G.M. Vasquez, E. Erhardt, C. Del Aguila, R. Pinedo, R. Cardenas, C. Pacheco, E. Chalco, H. Rodriguez-Ferruci, T.W. Scott, A.L. Lloyd, F. Gould, A.C. Morrison (2018). Efficacy of *Aedes aegypti* control by indoor Ultra Low Volume (ULV) insecticide spraying in Iquitos, Peru. PLOS Negl Trop Dis.
- M.R. Vella[†], C.E. Gunning, A.L. Lloyd, F. Gould (2017). Evaluating strategies for reversing CRISPR-Cas9 gene drives. Scientific Reports.
- C.E. Gunning, M.J Ferrari, E. Erhardt, H.J. Wearing (2017). Evidence of cryptic incidence in childhood diseases. Proceedings of the Royal Society B.
- C. Andris, D. Lee, M.J. Hamilton, M. Martino, C.E. Gunning, J.A. Selden (2015). The Rise of Partisanship and Super-cooperators in the US House of Representatives. PLoS ONE, 10(4), e0123507.
- C.E. Gunning, E. Erhardt, H.J. Wearing (2014). Conserved patterns of incomplete reporting in pre-vaccine era childhood diseases. Proceedings of the Royal Society B 281(1794), 20140886.
- C.E. Gunning & H.J. Wearing (2013). Probabilistic measures of persistence and extinction in measles (meta)populations. Ecology Letters 16(8), 985-994.
- D.M. Smith, D.M. Finch, C.E. Gunning, R. Jemison, J.F. Kelly (2009). Post-wildfire recovery of riparian vegetation during a period of water scarcity in the Southwestern USA. Fire Ecology 5(1), 38-55.

RESEARCH EXPERIENCE

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|--|----------------------|
| Post-doctoral Researcher | Feb 2019 - Present |
| Odum School of Ecology, UGA | Athens, GA |
| <ul style="list-style-type: none"> · Data integration & statistical analysis of historical and modern studies of pertussis, influenza, and SARS-CoV-2. · Lead analysis of pertussis cohort study in Lusaka, Zambia. · Mentor undergraduate and graduate students in scientific computing and reproducible research methods. | |
| Post-doctoral Researcher | Oct 2014 - July 2017 |
| Departments of Entomology and Mathematics, NCSU | Raleigh, NC |
| <ul style="list-style-type: none"> · Data integration & statistical analysis of <i>Ae. aegypti</i> field spraying trials in Iquitos, Peru · Continue development of Skeeter Buster, the <i>Aedes aegypti</i> population dynamics simulation model · Mentor graduate students in Mathematics and Entomology | |
| Research Assistant | Jan 2010 - Oct 2014 |
| Wearing Lab, UNM Biology | Albuquerque, NM |
| <ul style="list-style-type: none"> · Conduct original research for publication and assist with grant writing · Systems administrator and data manager · Undergraduate training and mentorship | |
| Hydrology Research Technician | Jan 2006 - Jan 2009 |
| Rocky Mountain Research Station, U.S. Forest Service | Albuquerque, NM |
| <ul style="list-style-type: none"> · Conduct original research and prepare technical reports for U.S. Forest Service · Collect and managed environmental monitoring data | |
| Plant Genetics Lab Technician | Jun 2003 - Jun 2004 |
| Malmberg Lab, UGA Plant Biology | Athens, GA |

- Isolated DNA, Conducted PCR
- Design data entry and management system

NMR Lab Technician

Jan 2001 - Jun 2002

Omichinski Lab, UGA Biochemistry and Molecular Biology

Athens, GA

- Administer mixed Unix workstation cluster
- Evaluate linux hardware/software for high-performance NMR data visualization

AWARDS AND FELLOWSHIPS

Aug 2009 Program in Interdisciplinary Biological and Biomedical Sciences (PiBBS) Fellowship. Two year fully funded tuition and graduate assistantship stipend (2010-2012).

GRANTS (TOTAL: \$362,400)

May 2022 (\$275,000). NIH R21, lead author. COVID-19 mass gatherings as natural experiments.

Jun 2011 (\$2,000). UNM PiBBS Student Enrichment Grant, SFI Complex Systems Summer School.

Mar 2010 (\$80,000). Center for Evolutionary & Theoretical Immunology (CETI) Seed Grant, contributing author. *Waning Immunity in Influenza and Whooping Cough*.

May 2007 (\$4,400). UNM Graduate Research and Development grant. *Hydrological research in the Middle Rio Grande Bosque*.

CONTRIBUTED TALKS

C.E. Gunning, C.J. Gill, W.B. MacLeod, R.C. Pieciak, and Pej Rohani. Longitudinal qPCR reveals persistent asymptomatic pertussis in Zambian mothers & infants. Annual meeting of the European Society For Paediatric Infectious Diseases. May 2021.

C.E. Gunning, C.J. Gill, W.B. MacLeod, R.C. Pieciak, and Pej Rohani. *Bordetella pertussis* in urban Southern Africa: Lessons from a mother/infant cohort study. International Bordetella Pertussis Lab Meeting. Feb 2022.

C.E. Gunning and A.L. Lloyd. Skeeter Buster Past, Present, and Future: Challenges and Issues in Modeling Mosquito Populations. Society of Vector Ecology. Albuquerque, NM. Sep 2015. SAMSI Program on Mathematical and Statistical Ecology Transition Workshop. Durham, NC. May 2015.

C.E. Gunning and H.J. Wearing. Appropriate Measures of Persistence in Childhood Diseases. SAMSI Program on Mathematical and Statistical Ecology Transition Workshop. Durham, NC. May 2015.

C.E. Gunning and H.J. Wearing. Reporting rate variation in U.S. cities. UNM Biology Research Day. Albuquerque, NM. Apr 2013.

C.E. Gunning. Measles dynamics in the pre-vaccine era United States: Linking models and data. UNM Biology Brownbag seminar series. Albuquerque, NM. Oct 2011.

C.E. Gunning and H.J. Wearing. Measles epidemics in pre-vaccine era United States cities: Linking models and data. Ecological Society of America conference. Austin, TX. Aug 2011.

C.E. Gunning. Spatio-temporal ecology of measles. UNM Biology Research Day. Albuquerque, NM. Apr 2011.

C.E. Gunning. Rwave - Detecting synchrony of influenza between U.S. states. useR 2010 Conference. Gaithersburg, MD. Jul 2010.

CONTRIBUTED POSTERS

C.E. Gunning, C. Andris, T.S. Brett, and P. Rohani. Signatures of focal mass gatherings: how cellular device records reveal COVID-era travel pulses. Ecology and Evolution of Infectious Disease (EEID) Conference. State College, PA. Jun 2023.

C.E. Gunning, C.J. Gill, W.B. MacLeod, R.C. Pieciak, and P. Rohani. Longitudinal qPCR reveals persistent asymptomatic pertussis in Zambian mothers & infants. Ecology and Evolution of Infectious Disease (EEID) Conference. Montpellier, France (remote). Jun 2021.

C.E. Gunning, A.I. Bento, P. Rohani. Heterogeneous Serologic Responses to Acellular Pertussis Vaccination. Ecology and Evolution of Infectious Disease (EEID) Conference. Princeton, NJ. Jun 2019.

C.E. Gunning, E. Erhard, H.J. Wearing. Pre-vaccine era reporting rates of measles and whooping cough. Ecology and Evolution of Infectious Disease (EEID) Conference. Fort Collins, CO. Jun 2014.

C.E. Gunning. Reporting rate variation of acute, immunizing diseases in pre-vaccine U.S. cities. Ecology and Evolution of Infectious Disease (EEID) Conference. State College, PA. May 2013.

C.E. Gunning. Stochasticity, persistence, and extinction in measles (meta)populations. Models of Infectious Disease Agent Study (MIDAS) meeting. Atlanta, GA. Jun 2012.

C.E. Gunning, H.J. Wearing. Stochasticity, persistence, and extinction in measles (meta)populations. Are we measuring what we think we're measuring? Ecology & Evolution of Infectious Disease (EEID) Conference. Ann Arbor, MI. May 2012.

C.E. Gunning. Using wavelets to detect synchrony of influenza between U.S. states. UNM Biology Research Day. Albuquerque, NM. Apr 2010.

C.E. Gunning. Linear Modeling of the Response of Groundwater Level to River Flow in the Middle Rio Grande Bosque, Water Year 2006. National Groundwater Association (NGWA) Conference. Albuquerque, NM. May 2007.

TEACHING

INSTRUCTOR

Introduction to Programming in C++ Fall 2018, Kenyon College Scientific Computing
Elements of Statistics Fall 2017 & Spring 2018, Kenyon College Statistics

Intro to Experimental Biology Fall 2017 & Spring 2018, Kenyon College Biology

Probability for Scientists Fall 2013, UNM Biology and Statistics

- Course designer, lead instructor

- Mixed undergraduate/graduate course (primarily undergraduate) covering introductory probability, statistics, and data analysis.

TEACHING ASSISTANT

Biology for Non-majors	Spring 2014, UNM Biology
Statistical Programming	Spring 2013, UNM Statistics
· Mixed undergraduate/graduate course (primarily graduate). Also guest lectured.	
Mathematical Biology	Fall 2012, UNM Biology
· Mixed undergraduate/graduate course (primarily undergraduate). Also guest lectured.	
Genetics	Spring 2009, UNM Biology
Ecology & Evolution	Fall 2008, UNM Biology

GUEST LECTURER

Ecology & Evolution of Animal Sex	Spring 2018, Kenyon College
Statistical Computing	Fall 2017, Kenyon College
Theoretical Ecology	Spring 2015, Univ. of Montana

WORKSHOPS AND TRAINING

Computational Skills for Scientists Training Workshop	Aug 2016, Univ. of Montana
· Guest lecturer	
Industrial Math/Stat Modeling Workshop for Graduate Students	July 2015, NCSU
· Guest instructor, student mentor	
Software Carpentry Workshop	Jan 2015, NCSU
· Teaching assistant, guest lecturer	
UNM R Programming Group	Fall 2010 - Spring 2013, UNM
· Organized and led weekly R programming group. Participants included undergraduate and graduate students and professors	
Ecology Workshop	May 2010, Univ. of Michigan
· Teaching assistant	
· NSF-funded graduate training program, part of Ecology and Evolution of Infectious Disease conference	

MENTORING

2015 - 2020. Robert Liberatore, Software Developer

2019 - 2021. Deven Gokhale, UGA Ecology Ph.D. student

2018 - 2022. Ryan Silver, Kenyon Mathematics Undergraduate student

2015 - 2017. Michael Vella, NCSU Mathematics Ph.D. student

2015 - 2017. Michael Vella, NCSU Mathematics Ph.D. student

2015 - 2017. Gabriel Zilnik, NCSU Entomology Masters student

2012 - 2014. Joshua Nightingale, UNM Biology Undergraduate student

2011 - 2012. Nathan Cournoyer, UNM Biology Undergraduate student

PROFESSIONAL EVENTS

Oct 2011. Rcpp R Programming Master Class. San Francisco, CA.

Jun 2011. Santa Fe Institute Complex Systems Summer School. Santa Fe Institute. Santa Fe, NM.

PROFESSIONAL SERVICE

Reviewer, Scientific Reports

Reviewer, Journal of Pediatric Infectious Diseases

Reviewer, Journal of the Royal Society Interface

Reviewer, BMC Infectious Diseases

Reviewer, PLOS Neglected Tropical Diseases

Reviewer, PLOS Computational Biology

Reviewer, Transactions of the Royal Society of Tropical Medicine and Hygiene.

Reviewer, Ecology Letters.

Reviewer, Theoretical Ecology.

Grant review, Digital Technology Development Award. Wellcome Trust.

Grant reader, Graduate Research Allocations Committee (GRAC). UNM Biology.

SOFTWARE DEVELOPMENT

Fall 2014 - Winter 2019. Develop and maintain Skeeter Buster: a stochastic, spatially-explicit, agent-based C++ simulation model of *Aedes aegypti* population dynamics.

Spring 2013. Wrote code, documentation, and tests according to specifications of Drs. J. M. Rowland and C. Qualls for discrimArts: R package for probability distribution estimation.

2010 - 2012. Contributor to Rcpp: R package for C++ development.

2009 - 2012. Maintainer of Rwave: R package for continuous wavelet transforms.

2010 - 2011. Contributor to xts and zoo: R packages for time series handling and analysis.

REFERENCES

Pej Rohani

Odum School of Ecology

- Co-author and post-doctoral advisor
- email: rohani@uga.edu

University of Georgia

Robert Milnikel

Department of Mathematics and Statistics

- Teaching Mentor
- email: milnikelr@kenyon.edu

Kenyon College

Alun Lloyd

Department of Mathematics

- Co-author and post-doctoral advisor
- email: alun_lloyd@ncsu.edu

North Carolina State University