

Current Position

2021–present **Assistant Professor**, Department of Biological Sciences, Purdue University, West Lafayette.
Research: Evolutionary models to understand genetic diversity and disease transmission

Professional Preparation

2015–2020 **Postdoctoral scholar**, Department of Ecology and Evolution, University of Chicago.
Advisor: Mercedes Pascual

2008–2014 **PhD, Ecology and Evolutionary Biology**, EEB, University of Michigan, Ann Arbor.
Advisor: L. Lacey Knowles

Thesis: Inferring histories of adaptive divergence with gene flow: genetic, demographic and geographic effects

2004–2008 **Bachelor of Science, Biological Sciences**, Fudan University, Shanghai.

Publications

- 2021 **Qixin He***, Shai Pilosof*, Kathryn E. Tiedje, Karen P. Day, and Mercedes Pascual. Frequency-Dependent Competition Between Strains Imparts Persistence to Perturbations in a Model of Plasmodium falciparum Malaria Transmission. *Frontiers in Ecology and Evolution*, volume 9, page 319, 2021. *Equal Contributions.
- 2021 **Qixin He** and Mercedes Pascual. An antigenic diversification threshold for falciparum malaria transmission at high endemicity. *PLOS Computational Biology*, volume 17, page e1008729, 2021.
- 2021 Rahul Subramanian, **Qixin He**, and Mercedes Pascual. Quantifying asymptomatic infection and transmission of COVID-19 in New York City using observed cases, serology, and testing capacity. *Proceedings of the National Academy of Sciences*, volume 118, page e2019716118, 2021.
- 2020 Jiaqi Tan, Xian Yang, **Qixin He**, Xia Hua, and Lin Jiang. Earlier parasite arrival reduces the repeatability of host adaptive radiation. *The ISME Journal*, volume 14, pages 2358–2360, 2020.
- 2019 Andréa T. Thomaz* and **Qixin He***. When are populations not connected like a circuit? Identifying biases in gene flow from coalescent times. *Molecular Ecology Resources*, volume 19, pages 1381–1384, 2019. *Equal Contributions.
- 2019 Jiaqi Tan*, **Qixin He***, Jennifer T. Pentz, Cheng Peng, Xian Yang, Meng-Hsiu Tsai, Yongsheng Chen, William C. Ratcliff, and Lin Jiang. Copper oxide nanoparticles promote the evolution of multicellularity in yeast. *Nanotoxicology*, volume 13, pages 597–605, 2019. *Equal Contributions.
- 2019 Shai Pilosof, **Qixin He**, Kathryn E. Tiedje, Shazia Ruybal-Pesántez, Karen P. Day, and Mercedes Pascual. Competition for hosts modulates vast antigenic diversity to generate persistent strain structure in Plasmodium falciparum. *PLOS Biology*, volume 17, page e3000336, 2019.
- 2018 **Qixin He**, Shai Pilosof, Kathryn E. Tiedje, Shazia Ruybal-Pesántez, Yael Artzy-Randrup, Edward B. Baskerville, Karen P. Day, and Mercedes Pascual. Networks of genetic similarity reveal non-neutral processes shape strain structure in Plasmodium falciparum. *Nature Communications*, volume 9, page 1817, 2018.

- 2017 **Qixin He**, Joyce R Prado, and Laura Lacey Knowles. Inferring the geographic origin of a range expansion: Latitudinal and longitudinal coordinates inferred from genomic data in an abc framework with the program x-origin. *Molecular Ecology*, volume 26, pages 6908–6920, 2017.
- 2017 **Qixin He** and L Lacey Knowles. Rapid adaptation with gene flow via a reservoir of chromosomal inversion variation? *bioRxiv*, page 150771, 2017.
- 2016 **Qixin He** and L Lacey Knowles. Identifying targets of selection in mosaic genomes with machine learning: applications in a nopheles gambiae for detecting sites within locally adapted chromosomal inversions. *Molecular ecology*, volume 25, pages 2226–2243, 2016.
- 2016 L Lacey Knowles, Rob Massatti, **Qixin He**, Link E Olson, and Hayley C Lanier. Quantifying the similarity between genes and geography across alaska's alpine small mammals. *Journal of Biogeography*, volume 43, pages 1464–1476, 2016.
- 2015 Hayley C Lanier, Rob Massatti, **Qixin He**, Link E Olson, and L Lacey Knowles. Colonization from divergent ancestors: glaciation signatures on contemporary patterns of genomic variation in collared pikas (ochotona collaris). *Molecular Ecology*, volume 24, pages 3688–3705, 2015.
- 2013 **Qixin He**, Danielle L Edwards, and L Lacey Knowles. Integrative testing of how environments from the past to the present shape genetic structure across landscapes. *Evolution*, volume 67, pages 3386–3402, 2013.
- 2012 L Lacey Knowles, Hayley C Lanier, Pavel B Klimov, and **Qixin He**. Full modeling versus summarizing gene-tree uncertainty: method choice and species-tree accuracy. *Molecular phylogenetics and evolution*, volume 65, pages 501–509, 2012.
- 2010 Huateng Huang, **Qixin He**, Laura S Kubatko, and L Lacey Knowles. Sources of error inherent in species-tree estimation: impact of mutational and coalescent effects on accuracy and implications for choosing among different methods. *Systematic biology*, volume 59, pages 573–583, 2010.
- 2009 Wei Yin, Cuizhang Fu, Li Guo, **Qixin He**, Jun Li, Binsong Jin, Qianhong Wu, and Bo Li. Species delimitation and historical biogeography in the genus helice (brachyura: Varunidae) in the northwestern pacific. *Zoological Science*, volume 26, pages 467–475, 2009.
- 2009 Jun Li, **Qixin He**, Xia Hua, Jie Zhou, Huidan Xu, Jiakuan Chen, and Cuizhang Fu. Climate and history explain the species richness peak at mid-elevation for schizothorax fishes (cypriniformes: Cyprinidae) distributed in the tibetan plateau and its adjacent regions. *Global Ecology and Biogeography*, volume 18, pages 264–272, 2009.
- 2009 Xia Hua, W Wang, W Yin, **Qixin He**, B Jin, Jun Li, Jiakuan Chen, and Cuizhang Fu. Phylogeographical analysis of an estuarine fish, salanx ariakensis (osmeridae: Salanginae) in the north-western pacific. *Journal of Fish Biology*, volume 75, pages 354–367, 2009.

Software & Pipelines

- iDDC He, Edwards & Knowles (2013) Evolution
 X-Origin He, Prado & Knowles (2017) Molecular Ecology
 varmodel He et al. (2018) Nature Communications

Presentations

Invited Talks

- Jan 2021 **Qixin He** and Mercedes Pascual. An antigenic diversification threshold for falciparum malaria transmission at high endemicity. In *Workshop on Limits to Diversity Assembly*, International Centre for Theoretical Physics, Italy, Jan 2021.
- Nov 28 2018 **Qixin He**, Shai Pilosof, Kathryn E. Tiedje, Shazia Ruybal-Pesántez, Yael Artzy-Randrup, Edward B. Baskerville, Karen P. Day, and Mercedes Pascual. Why is malaria a chronic disease? immune selection promotes malaria antigenic diversity at genetic and strain levels across time. In *Departmental Seminar*, University of Oklahoma, Norman, OK, Nov 28 2018.

July 11 2018 **Qixin He**, Shai Pilosof, Kathryn E. Tiedje, Shazia Ruybal-Pesántez, Yael Artzy-Randrup, Edward B. Baskerville, Karen P. Day, and Mercedes Pascual. Agent-based simulations and network analyses reveal the strain structure of falciparum malaria. In *Melbourne Integrative Genomics*, University of Melbourne, Australia, July 11 2018.

Conference Presentations

- 2021 **Qixin He** and Mercedes Pascual. An antigenic diversification threshold for infectious diseases by combining population genetic and epidemiological processes. In *Midwest Population Genetics*, University of Wisconsin, Madison, 2021.
- 2021 **Qixin He** and Mercedes Pascual. An antigenic diversification threshold for falciparum malaria and its control at high endemicity. In *EEID*, Online, 2021.
- 2021 **Qixin He** and Mercedes Pascual. An antigenic diversification threshold for falciparum malaria and its control at high endemicity. In *Evolution*, Online, 2021.
- 2020 **Qixin He** and Mercedes Pascual. An antigenic diversification threshold for falciparum malaria and its control at high endemicity. In *ESA*, Online, 2020.
- 2019 **Qixin He** and Mercedes Pascual. A novel epidemiological threshold related to parasite antigenic diversification. In *Epidemics*, Charleston, SC, USA, 2019.
- 2019 **Qixin He** and Mercedes Pascual. Evolutionary and ecological determinants of functional diversification in antigen gene families. In *Evolution*, Providence, RI, USA, 2019.
- 2017 **Qixin He** and Mercedes Pascual. Networks of genetic similarity reveal the role of non-neutral processes in shaping the strain structure of *Plasmodium falciparum*. In *ESA Symposium: Turn and Face the Strain: Changing Signatures of Niche Processes in Disease and Community Diversity*, Santa Barbara, CA, 2017.
- 2017 **Qixin He** and Mercedes Pascual. Networks of genetic similarity reveal the role of non-neutral processes in shaping the strain structure of *Plasmodium falciparum*. In *ESA Symposium: Turn and Face the Strain: Changing Signatures of Niche Processes in Disease and Community Diversity*, Portland, OR, 2017.
- 2016 **Qixin He**, Shai Pilosof, and Mercedes Pascual. Does specific immunity selection structure the plasmodium falciparum population into strains from the perspective of the major blood antigen Pfemp1? In *Evolution*, Austin, TX, 2016.
- 2016 **Qixin He**, Shai Pilosof, and Mercedes Pascual. Does specific immunity selection structure the plasmodium falciparum population into strains from the perspective of the major blood antigen Pfemp1? In *ISEMPH*, Durham, NC, 2016.
- 2014 **Qixin He** and L. Lacey Knowles. Locating a selection signature inside chromosomal rearrangements fortests of adaptive divergence in *Anopheles gambiae*. In *Evolution*, Raleigh, NC, 2014.
- 2013 **Qixin He** and L. Lacey Knowles. Integrative testing of how environments from the past to the present shape genetic structure across landscapes. In *Evolution*, Snowbird, Utah, 2013.
- 2013 **Qixin He** and L. Lacey Knowles. Genomic tests of whether chromosomal rearrangements facilitated local adaptation in anopheles gambiae based on coalescent expectations. In *Evolution*, Lisbon, Portugal, 2013.
- 2011 **Qixin He** and L. Lacey Knowles. Utility of next-generation sequencing for phylogenomic analysis. In *Evolution*, University of Oklahoma, Norman, OK, 2011.
- 2010 **Qixin He**, Diego F. A-Serrano, Huateng Huang, and L. Lacey Knowles. An approach for coupling ecological, demographic, and genetic models to test spatially-explicit phylogeographic hypotheses. In *Evolution*, Portland State University, Portland, OR, 2010.
- 2009 **Qixin He** and L. Lacey Knowles. Rapid evolution via standing variation: an adaptive seed bank in chromosomal inversions. In *Evolution*, University of Idaho, Moscow, ID, 2009.

Posters

- 2018 **Qixin He**, Shai Pilosof, Kathryn E. Tiedje, Shazia Ruybal-Pesántez, Karen P. Day, and Mercedes Pascual. Static and temporal signatures of immune selection in *Plasmodium falciparum* revealed through network analyses of var genes and their repertoires. In *First Malaria World Congress*, Melbourne Convention & Exhibition Centre, Australia, 2018.
- 2012 **Qixin He**, Shai Pilosof, Kathryn E. Tiedje, Shazia Ruybal-Pesántez, Karen P. Day, and Mercedes Pascual. Species-tree estimation using snp data from deep sequencing in non-model organisms. In *Evolution*, Ottawa Convention Centre, Canada, 2012.
- 2009 **Qixin He** and L. Lacey Knowles. Can the intrinsic limitations of dna sequences for phylogenetic estimation be overcome? In *5th Annual Early Career Scientists Symposium: Using Phylogenies in Ecology*, University of Michigan, Ann Arbor, MI, 2009.

Awards & Research Support

- April 2014 **Tinker Scholarship**, *outstanding student of the Museum of Zoology*, University of Michigan.
- April 2013 **Edwin H. Edwards Fellowship**, University of Michigan.
- April 2013 **EEB student outstanding paper award**, *Q. He, D. Edwards, L. L. Knowles (2013)*, University of Michigan.
- April 2012 **Hinsdale Museum of Zoology Scholarship Award**, *Museum of Zoology*, University of Michigan, (\$4000).
- March 2012 **NSF Doctoral Dissertation Improvement Grant**, NSF, (\$15,000).
- April 2011 **Hinsdale Museum of Zoology Scholarship Award**, *Museum of Zoology*, University of Michigan, (\$5000).
- March 2011 **International Research Award**, *International Institute*, University of Michigan, (\$3000).
- May 2010 **Block Grant funds**, *EEB*, University of Michigan.
- May 2007 **National Talent Training Fund in Basic Research (J0630643)**, NSF, China.
Project: Elevational diversity pattern of Schizothorax fishes: ecological and evolutionary causes

Teaching Experience

- 2008–2009 **Graduate Student Instructor**, *Bio171: introductory biology*, University of Michigan.

Professional Societies

- 2008–present The Society for the Study of Evolution (SSE), Ecological Society of America (ESA)

Reviewer

PNAS, Heredity, Systematic Biology, Molecular Ecology, Molecular Ecology Resources, Evolution, PLoS Computational Biology, Communications Biology, Journal of Biogeography, Virus Evolution, PLoS One, FONDECYT Chilean National Science and Technology grants

Service and Outreach

- 2010, 2021 **Undergraduate student mentor**, *Conference: Evolution*.
Mentored Richard Coleman and Milinda Thompson
- 2010–2011 **EEB seminar committee**, University of Michigan.
- 2013 **Organization committee**, *Ninth annual Early Career Scientists Symposium*, University of Michigan.
- 2015 **Co-organizer**, *Oral session “community and ecosystem effects of rapid evolution”*, ESA.
- 2019-2021 **Instructor**, *Flu for fun*, EYH-workshop for middle school girls, Chicago.