
Curriculum Vitae
Matthew Richard Helmus
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EDUCATION

- PhD in Zoology 2008
University of Wisconsin, Madison, WI
Thesis title: *Phylogenetic signal in ecological community responses to environmental variability*. Anthony R. Ives, advisor
- BS cum laude in Biology and Sociology, minor Interdisciplinary Studies 2001
University of Central Arkansas, Conway, AR
Thesis title: *Do milkweed glues or poisons trigger vein severance by monarch caterpillars?* David E. Dussourd, advisor

ACADEMIC POSITIONS

- Postdoctoral Bioinformatic Fellow, Timothy Wootton begins 2010
University of Chicago, U.S.A.
- Postdoctoral Bioinformatic Fellow, Charles Cannon, present
Xishuangbanna Tropical Botanical Garden, China
- Graduate research and teaching assistant, Anthony Ives, 2002-2008
University of Wisconsin, Madison, U.S.A.
- Research technician and teaching assistant, David Dussourd, 2002
University of Central Arkansas, Conway, U.S.A.

RESEARCH SUMMARY

I am a community/food web ecologist. I use theory, experimentation, genetics, and observational studies to understand how the structure of ecological communities and food webs has evolved, how it is naturally maintained, and how it is affected by humans. My research questions are ecological, but I approach them in an evolutionary context that hopefully leads to a deeper understanding of natural phenomena. I have worked mostly in aquatic systems and have projects in Mexico and China.

My current, unpublished research projects are:

Phylogenetic approaches to community assembly

- Phylogenetic species area curves of North American flora

The ecology and evolution of species interactions

- A comprehensive test for phylogenetic signal in species interactions

Invasion and extinction ecology

- Prediction of Mexican freshwater fish species extinction and invasion rates using species traits and evolutionary history

Ecological genomics

- Developing novel assembly free approaches to comparative genomics in nonmodel organisms.

ACADEMIC/RESEARCH AWARDS AND RECOGNITIONS

1. *Invited Speaker for the Early Career Scientists Symposium* (2009), University of Michigan, Ann Arbor, MI, U.S.A.
2. *Honorable Mention Murray F. Buell Award* (2007) for an outstanding oral presentation at the Ecological Society of America 92nd annual conference
3. *Outstanding Paper Award* (2006) at the Pioneering Studies of Young Scientists on Chemical Pollution and Environmental Changes Symposia, Center for Marine Environmental Studies, Ehime University, Japan
4. *University of Central Arkansas Outstanding Student* (2001) an award recognizing excellence in academic achievements based on nominations from the faculty

TEACHING EXPERIENCE

Guest Lecturer

1. *Advanced Field Ecology and Conservation Course*, Xishuangbanna Tropical Botanical Garden, Yunnan, China
2. *Introduction to Ecology and Evolution*, nonmajors, University of Wisconsin, Madison

Teaching assistant (8 total semesters)

1. *Introduction to Biology II*, majors, University of Wisconsin, Madison (4 semesters)
2. *Introduction to Ecology and Evolution*, nonmajors, University of Wisconsin, Madison (2 semesters)
3. *Introduction to Biology I*, majors, University of Wisconsin, Madison (1 semester)
4. *Introduction to Biology II*, majors, University of Central Arkansas, Conway (1 semester)

COMPETITIVE FUNDING (USD)

Extramural

1. U.S. National Science Foundation, Postdoctoral Research Fellowship in Biological Informatics, \$120,000, *Testing for phylogenetic signal in species interactions* (begins 2010)
2. National Science Foundation of China, \$25,000, *Using genomics to assess the importance of temporal niches, spatial niches and neutral mechanisms in maintaining tree biodiversity* (2009)
3. Chinese Academy of Sciences, Postdoctoral Research Fellowship, \$25,000, *Developing the field of phylogenetic community ecology* (2009)
4. National Evolutionary Synthesis Center-Google Summer of Code, \$5,000, *Enhancing the representation of ecophylogenetic tools in R* (2008)

5. UC MEXUS-CONACYT, University of California - El Consejo Nacional de Ciencia y Tecnología, \$25,000, *Hotspots of biodiversity in central México: implications and importance for habitat conservation in human-dominated watersheds* (2006)
6. Grant in Aid of Research, Sigma Xi, \$600, *Why does milkweed latex trigger vein severance by monarch caterpillars?* (2001)

Intramural

1. Graduate Research Grant, UW Madison Department of Zoology, \$1750, *Nonrandom extinction of Mexican fishes* (2007)
2. Graduate Research Grant, UW Madison Department of Zoology, \$1500, *Human alterations to the phylogenetic structure of native Mexican fish communities* (2006)
3. Nave Short Term Field Research Grant, Latin American Caribbean & Iberian Studies, \$550, *Reservoir subsidies to tailwater fish communities of central Mexico* (2004)
4. Graduate Research Grant, UW Madison Department of Zoology, \$1400, *The trophic cascade of Presa Allende and an IBI for the Rio Laja, Mexico* (2003)
5. Nave Short Term Field Research Grant, Latin American Caribbean & Iberian Studies, \$950, *A Macroinvertebrate IBI for the Rio Laja, Mexico* (2003)
6. Anna Grant Birge Graduate research Grant, UW Madison Center for Limnology, \$650, *The Trophic Cascade of Presa Allende, Mexico* (2003)
7. Undergraduate Research Grant, U of Central Arkansas Department of Biology, \$665, *What characteristic of milkweed latex triggers vein severance by monarch caterpillars?* (2001)
8. Undergraduate Research Grant, U of Central Arkansas Department of Biology, \$450, *Why does milkweed latex trigger vein severance by monarch caterpillars?* (2001)
9. Honors College Travel Abroad Grant, U of Central Arkansas Honors College, \$2000, *Tropical herpetology in Costa Rica and Nicaragua* (2001)
10. Honors College Travel Abroad Grant, U of Central Arkansas Honors College, \$5000, *Semester at sea* (2000)

SERVICES, AFFILIATIONS & SYNERGISTIC ACTIVITIES

- Member of the *Ecological Society of America, Association for Tropical Biology and Conservation*
- Ad hoc reviewer for *American Naturalist, Ecology, Ecology Letters, Ecological monographs, Oikos, Hydrobiologia, Environmental Biology of Fishes*
- Mentored 7 undergraduates on semi-independent research topics with 5 student projects published, submitted or in preparation for submission
- Graduate Mentor for Ways of Knowing Biology, promotes biology to freshmen
- Science is Fun with Dr. Bassam Shakhashiri, promotes science to children

PUBLICATIONS (* indicates mentored student)

In peer-reviewed journals

1. **Helmus, M.R.** & D.E. Dussourd. (2005) Glues or poisons: which triggers vein cutting by monarch caterpillars? *Chemoecology* 15:45-49

2. **Helmus, M.R.**, *T.J. Bland, C.K. Williams & A.R. Ives. (2007) Phylogenetic measures of biodiversity. *American Naturalist* 169: E68-E83
3. **Helmus, M.R.**, *K. Savage, M.W. Diebel, J.T. Maxted & A.R. Ives. (2007) Separating the determinants of phylogenetic community structure. *Ecology Letters* 10: 917-925
4. Newton, R.J., S.E. Jones, **M.R. Helmus** & K.D. McMahon. (2007) Phylogenetic ecology of the freshwater acI lineage. *Applied and Environmental Microbiology* 73:7169-7176
5. **Helmus, M.R.** & G.G. Sass. (2008) The rapid effects of a whole-lake reduction of coarse woody debris on fish and benthic macroinvertebrates. *Freshwater Biology* 53:1423-1433
6. **Helmus, M.R.**, *L. Allen, O. Dominguez-Dominguez, E. Díaz Pardo, P. Gesundheit, J. Lyons & N. Mercado Silva. (2009) Threatened fishes of the world: *Allotoca goslinei* Smith and Miller, 1987 (Goodeidae). *Environmental Biology of Fishes* 84:197-198
7. *Ahrenstorff, T.D., G.G. Sass & **M.R. Helmus**. (2009) The influence of littoral zone coarse woody habitat on the home range size, spatial distribution and feeding ecology of largemouth bass (*Micropterus salmoides*). *Hydrobiologia* 623:223-233
8. Mercado Silva, N., **M.R. Helmus** & M.J. Vander Zanden. (in press) Food web structure of an impacted semi-desertic river in Mexico's central plateau. *River Research and Applications*
9. **Helmus, M.R.**, W. Keller, M.J. Paterson, C.H. Cannon, N.D. Yan and J.A. Rusak. (in press) Communities contain closely related species during ecosystem disturbance. *Ecology Letters*

Submitted manuscripts

1. Ives, A.R. and **M.R. Helmus**. A phylogenetic measure of community similarity. *Ecology*
2. Rodríguez-Álvarez, Z., M. Medina-Nava, **M.R. Helmus**, E. Solorio-Ornelas, J.P. Ramírez-Herrejón and F. Cruz-Martínez. Current state of the viviparous fish species of the Cuitzeo basin in Michoacan, Mexico. *Viviparous fishes II. New Life publications*. (Book Chapter)
3. Ramírez Herrejón, J.P., M. Medina-Nava, **M.R. Helmus**, E. Solorio-Ornelas and C.I. Salazar-Tinoco. Historical assessment of livebearing fishes community in Zacapu lake, Michoacán, Mexico. *Viviparous fishes II. New Life publications*. (Book Chapter)

Draft manuscripts

1. Scheiner, S.M., A. Chiarucci, G.A. Fox, **M.R. Helmus**, D.J. McGlenn and M.R. Willig. *The underpinnings of the relationship between space, time, and species richness*
2. **Helmus, M.R.**, *L. Allen, B.J. Cardinale, E. Diaz Pardo, O. Dominguez Dominguez, A.R. Ives, J. Lyons, J. Maxted, M. Medina Nava and N. Mercado Silva. *Evolutionary relationships explain species invasion and extinction rates at the confluence of nearctic and neotropical freshwater fishes*

WORKSHOP PARTICIPATION

1. Linking phylogenetic history, plant traits, and ecological processes at multiple scales (2009) National Center for Ecological Analysis and Synthesis (NCEAS). Jeannine Cavender-Bares and David Ackerly (organizers)
2. Evolutionary and ecological sorting in space (2008) NCEAS. Mathew Leibold and Mark Urban (organizers)
3. International Long Term Ecological Research strategic planning meeting (2005) Colima, Mexico. Steve Hamburg and ILTER executive committee (organizers)
4. Littoral zone structural complexity workshop (2003) North Temperate Lakes Long Term Ecological Research Station. Greg Sass (organizer)

RESEARCH PRESENTATIONS

Invited talks

1. **Helmus, M.R.** (2009) *Evolutionary history explains species invasions and extinctions at the confluence of nearctic and neotropical freshwater fishes*. Early Career Scientists Symposium, University of Michigan, Ann Arbor, MI, U.S.A.
2. **Helmus, M.R.** (2007) *Using community phylogenies to understand ecosystem change*. Xishuanbanna Tropical Botanical Garden, Xishuanbanna, Yunnan, China
3. **Helmus, M.R.** (2007) *Using community phylogenies to understand ecosystem change*. Instituto de Ecología (INECOL), Xalapa, Veracruz, México
4. **Helmus, M.R.** (2007) *Using community phylogenies to understand changes in aquatic ecosystems*. Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara, CA, U.S.A.
5. **Helmus, M.R.** & A.R. Ives. (2006) *Using community phylogenies to understand changes in aquatic ecosystems*. Pioneering Studies of Young Scientists on Chemical Pollution and Environmental Changes, Center for Marine Environmental Studies, Ehime University, Matsuyama, Shikoku, Japan
6. **Helmus, M.R.** & A.L. Tandberg. (2003) *The role of coarse-woody habitat in the composition of littoral invertebrate communities*. Littoral Zone Structural Complexity Workshop, Center for Limnology, Trout Lake Station, Boulder Junction, WI, U.S.A.

Submitted talks

1. **Helmus, M.R.** (2009) *Ecophylogenetic tools for tropical biology*. Association for Tropical Biology and Conservation, Asian-Pacific Chapter 3rd annual conference, Chaing Mai, Thailand
2. **Helmus, M.R.**, J.A. Rusak, M.J. Paterson, W. Keller and N.D. Yan. (2007) *Communities contain closely related species during ecosystem disturbance: Examples from whole-lake experiment zooplankton communities*. Ecological Society of America 92nd annual conference, San Jose, CA, U.S.A.
3. **Helmus, M.R.**, N. Mercado-Silva and M.J. Vander Zanden. (2006) *Impoundment subsidies to native and exotic fishes of central Mexico*. Ecological Society of America international conference, Ecology in an Era of Globalization, Mérida, Yuc., México (poster)
4. Mercado-Silva N., M.J. Vander Zanden, **M.R. Helmus**, E. Díaz-Pardo and J. Lyons, (2005) *Food-web relations among fishes in a modified semi-desert river*

- system in Central Mexico*. Desert Fish Council Meeting 37th annual meeting, Cuatro Ciénegas, Coah., México
5. **Helmus, M.R.**, T.J. Bland, C.K. Williams and A.R. Ives. (2005) *Can phylogenetics explain patterns of diversity among north temperate lakes?* Ecological Society of America 90th annual conference, Montréal, QC, Canada
 6. Gille, C.M., C.T. Harvey, **M.R. Helmus**, E.H. Stanley and J.F. Kitchell. (2004) *Factors structuring tidal creek fish communities on Sapelo Island, GA*. American Fisheries Society, Madison, WI, U.S.A. (poster)
 7. **Helmus, M.R.**, A.E. Tandberg and G.G. Sass. (2004) *The macroinvertebrate community of Little Rock Lake: Species specific and community wide impacts due to a whole-ecosystem manipulation of coarse-woody habitat*. Ecological Society of America 89th annual conference, Portland, OR, U.S.A.
 8. Forbes, A.E., B.J. Cardinale, C.T. Harvey, **M.R. Helmus**, A.R. Ives, K.J. Tilmon and C.K. Williams. (2004) *Will physics envy ever die?* Ecological Society of America 89th annual conference, Portland, OR, U.S.A.
 9. **Helmus, M.R.** and D.E. Dussourd. (2003) *The vein-cutting monarch: a bioassay for vein-cutting stimulants in milkweed latex*. Ecological Society of America 88th annual conference, Savannah, GA, U.S.A.
 10. **Helmus, M.R.** and D.E. Dussourd. (2001) *Glues or poisons: why do monarchs sever milkweed veins?* Entomological Society of America 49th annual conference, San Diego, CA, U.S.A. (poster)

STUDENTS MENTORED

- Kristina Savage – undergraduate, University of Wisconsin, Madison
Thesis: *Community phylogenetic structure in centrarchids* (published)
- Tom Bland – undergraduate, University of Wisconsin, Madison
Thesis: *Environmental drivers of phylogenetic distributions in northern Wisconsin freshwater fishes* (published)
- Tyler Ahrenstorff - undergraduate, University of Wisconsin, Madison
Thesis: *Effects of littoral zone coarse woody habitat on the home range of largemouth bass (*Micropterus salmoides*)* (published)
- Lauren Allen – undergraduate, University of Wisconsin, Madison
Thesis: *The locations of remnant fish biodiversity hotspots in central Mexico* (manuscript in prep.)
- Adrienne Tandberg – undergraduate, University of Wisconsin, Madison
Thesis: *Measuring cohesiveness in lake groups and its relation to ecological variables* (project complete)
- Lindsay Focht – undergraduate, University of Wisconsin, Madison
Project: *The colonization of coarse woody habitat by macroinvertebrate communities* (project complete)
- Sara Green – undergraduate, University of Wisconsin, Madison
Project: *Do North American odonates follow Bergmann's rule?* (project complete)

POSTDOC ADVISOR

Charles Cannon chuck@xtbg.ac.cn

PHD COMMITTEE MEMBERS

Tony Ives (advisor) arives@wisc.edu
Jake Vander Zanden mjvanderzand@wisc.edu
Jim Kitchell kitchell@wisc.edu
Carol Lee carollee@wisc.edu
Bret Larget larget@stat.wisc.edu

COLLABORATORS

Brad Cardinale – University of California, Santa Barbara
Norm Yan – York University
Mike Paterson – Fisheries and Oceans Canada
Bill Keller – Ontario Ministry of the Environment
Trina McMahon – University of Wisconsin, Madison
Norman Mercado Silva – University of Arizona
Jim Rusak – Dorset Environmental Science Centre
Greg Sass – Illinois Natural History Survey
Samuel Scheiner – U.S. National Science Foundation