

NATHAN MOREHOUSE

Institut de Recherche sur la Biologie de l'Insecte
Université de Tours
37200 Tours, France
+33 (0)2 47 36 73 66 office
+33 (0)2 47 36 69 66 fax
nathan.morehouse@univ-tours.fr
<http://casas-lab.irbi.univ-tours.fr/home.html>

EDUCATION

Arizona State University August 2002 – May 2009
School of Life Sciences, Tempe, AZ
Ph.D., Biology
Dissertation Title: *Limiting Nutrients, Female Choice, and Male Color*
Major Advisor: Dr. Ronald L. Rutowski

Cornell University August 1996 – May 2000
College of Agriculture and Life Sciences, Ithaca, NY
Bachelor of Sciences, Biological Sciences, Distinction in Research
Research Thesis Title: *Sexual Dimorphism and Visual Tracking in Sarcoptagid Flies*
Research Thesis Advisor: Dr. Cole Gilbert

CURRENT POSITION

European Union Marie Curie International Incoming Fellow June 2009 – Present
Collaborator: Jérôme Casas
Project Title: *Nutritional Ecology and Seasonal Color Polymorphism in a Butterfly*
Institut de Recherche sur la Biologie de l'Insecte, Université de Tours, France

RESEARCH INTERESTS

Evolution of sexual dimorphism and polyphenism, visual ecology, evolution of sensory systems, color vision and learning, evolution of bright coloration, biophotonics, optical physics of animal coloration, pigment biochemistry, nutritional ecology and physiology, hormonal and genetic regulation of nutrient allocation, quantitative genetics, plant-herbivore co-evolution, life history evolution, sexual selection theory, selective heterogeneity at landscape and geographic scales

RESEARCH EXPERIENCE

Division of Graduate Studies Dissertation Fellow August 2007 – May 2008
School of Life Sciences, Arizona State University, Tempe, AZ

Graduate Research Assistant January – August 2006
School of Life Sciences, Arizona State University, Tempe, AZ

Graduate Research Assistant Summers, 2003-2005
University Graduate Scholarship
School of Life Sciences, Arizona State University, Tempe, AZ

RESEARCH EXPERIENCE (CONT.)

Independent Research/ Honors Thesis May 1999 – May 2000
Professor Cole Gilbert
Dept. of Entomology, Cornell University, Ithaca, NY

Field Assistant July 1999, January 2000
Research Assistant October 1998 – June 1999
Professor Alison Power
Dept. of Ecology, Cornell University, Ithaca, NY

TEACHING EXPERIENCE

Graduate Teaching Assistant August – December 2008
IND 464: Collaborative Design and Development I
Innovation Space, College of Design, Arizona State University, Tempe, AZ
innovationspace.asu.edu

Graduate Teaching Assistant May – August 2008
School of Life Sciences Undergraduate Research Program May – August 2007
Arizona State University, Tempe, AZ

Faculty Associate August 2006 – May 2007
Center for Research on Education in Science, Mathematics, Engineering and Technology
Arizona State University, Tempe, AZ
cresmet.asu.edu

NSF GK-12 Fellow
Graduate Partners in Science Education, Program Coordinator August 2005 – May 2006
Phoenix Preparatory Academy, Phoenix, AZ
Desert Eagle Secondary School, 7th and 8th Grade Science June 2003 – May 2004
Salt River Pima Maricopa Indian Community, AZ
gk12.asu.edu

Graduate Teaching Assistant January – May 2005
Bio 100: Introductory Biology for Non-Majors August 2002 – May 2003
Bio 415: Biometry August – December 2004
School of Life Sciences, Arizona State University, Tempe, AZ

Substitute Science Teacher January – June 2001
Wilson Magnet High School
Rochester City School District, Rochester, NY

PUBLICATIONS

Meadows, M.G., **Morehouse, N.I.**, Rutowski, R.L., Douglas, J.M. and McGraw, K.J.
Submitted. *Quantifying iridescent coloration in animals: A method for improving repeatability.*

Morehouse, N.I. and Rutowski, R.L. In press. *In the eyes of the beholders: Female choice and avian predation risk associated with an exaggerated male butterfly color.* American Naturalist.

Van Gossum, H., Bots, J, Van Heusden, J, Hammers, M., Katleen, H. and **Morehouse, N.I.**
2010. *Reflectance spectra and morph mating frequencies support intraspecific mimicry in the female colour polymorphic damselfly Ischnura elegans.* Evolutionary Ecology. doi: 10.1007/s10682-010-9388-z

PUBLICATIONS (CONT.)

Lindstedt, C., **Morehouse, N.I.**, Pakkanen, H., Casas, J., Christides, J.P., Kemppainen, K., Lindström, L. and Mappes, J. 2010. *Characterizing the pigment composition of a variable warning signal of *Parasemia plantaginis* larvae*. *Functional Ecology*, **24**(4): 759-766. doi: 10.1111/j.1365-2435.2010.01686.x

Morehouse, N.I., Nakazawa, T., Booher, C.M., Jeyasingh, P.D. and Hall, M.D. 2010. *Sex in a material world: Why the study of sexual reproduction and sex-specific traits should become more nutritionally-explicit*. *Oikos*, **119**(5), 766-778. doi:10.1111/j.1600-0706.2009.18569.x
**Invited article

Morehouse, N.I. and Rutowski, R.L. 2010. *Developmental responses to variable diet composition in the cabbage white butterfly, *Pieris rapae*: the role of nitrogen, carbohydrates and genotype*. *Oikos*, **119**(4), 636-645. doi:10.1111/j.1600-0706.2009.17866.x

Morehouse, N.I. and Rutowski, R.L. 2009. *Comment on "Floral iridescence, produced by diffraction optics, acts as a cue for animal pollinators."* *Science*, **325**, 1072-d. doi:10.1126/science.1173324

Shawkey, M.D., **Morehouse, N.I.** and Vukusic, P. 2009. *A protean palette: colour materials and mixing in birds and butterflies*. *Journal of the Royal Society Interface*, **6**, S221-S231. doi:10.1098/rsif.2008.0459.focus

Meadows, M.G., Butler, M.W., **Morehouse, N.I.**, Taylor, L.A., Toomey, M.B., McGraw, K.J. and Rutowski, R.L. 2009. *Iridescence: views from many angles*. *Journal of the Royal Society Interface*, **6**, S107-113. doi:10.1098/rsif.2009.0013.focus

McGraw, K.J., Toomey, M.B., Nolan, P.M., **Morehouse, N.I.**, Massaro, M. and Jouventin, P. 2007. *A description of unique fluorescent yellow pigments in penguin feathers*. *Pigment Cell Research*, **20**, 301-304. doi:10.1111/j.1600-0749.2007.00386.x

Rutowski, R.L., Macedonia, J., Merry, J., **Morehouse, N.I.**, Yturralde, K., Taylor-Taft, L., Gaalema, D., Kemp, D.J. and Papke, R.S., 2007. *Iridescent ultraviolet signaling in the Orange Sulphur butterfly (*Colias eurytheme*): Spatial, temporal and spectral properties*. *Biological Journal of the Linnean Society*, **90**, 349-364. doi:10.1111/j.1095-8312.2007.00749.x

Morehouse, N.I., Vukusic, P. and Rutowski, R.L. 2007. *Pterin pigment granules are responsible for both broadband light scattering and wavelength selective absorption in the wing scales of pierid butterflies*. *Proceedings of the Royal Society of London B*, **274**, 359-366. doi:10.1098/rspb.2006.3730
**Featured article

Merry, J., **Morehouse, N.I.**, Yturralde, K., and Rutowski, R.L., 2006. *Eyes of a patrolling butterfly: Visual field and eye structure in the Orange Sulphur, *Colias eurytheme* (Lepidoptera, Pieridae)*. *Journal of Insect Physiology*, **52**(3), 240-248. doi:10.1016/j.jinsphys.2005.11.002

Rutowski, R.L., Macedonia, J., **Morehouse, N.I.** and Taylor-Taft, L., 2005. *Pterin pigments amplify iridescent ultraviolet signal in males of the orange sulphur butterfly, *Colias eurytheme**. *Proceedings of the Royal Society of London B*, **272**, 2329-2335. doi:10.1098/rspb.2005.3216
**Cover article

INVITED PRESENTATIONS

Morehouse, N.I. and Rutowski, R.L. *Limiting nutrients, bright colors and male genetic quality: Why female *Pieris rapae* prefer colorful mates*. Oral presentation, *Color Signals and Cues in the Lives of Butterflies: Perception, Learning and Function Symposium*, 6th International Conference on the Biology of Butterflies, Edmonton, Canada, June, 2010.

Morehouse, N.I. *L'écologie de la nutrition et l'évolution de la couleur polyphénisme saisonniers dans un papillon*. Journée IRBI, Université de Tours, Tours, France, June 2010.

INVITED PRESENTATIONS (CONT.)

Morehouse, N.I. *Nature: the illustrative past and bright future of design.* Oral presentation representing Autodesk and the Biomimicry Institute, *Design and Sustainability Symposium*, Congress on the Future of Engineering Software 2009, Scottsdale, AZ, April, 2009.

Morehouse, N.I. *The nutrient ecology of bright butterfly colors: Currencies, costs and evolutionary considerations.* Oral presentation, *Evolution and Development of Colour Patterns Symposium*, 5th International Conference on the Biology of Butterflies, Rome, Italy, July, 2007.

Morehouse, N.I. *Flying colors: Towards an evolutionary understanding of bright wing coloration in pierid butterflies.* Kikikose Seminar Series, Université de Tours, Tours, France, May, 2007.

Morehouse, N.I. *Innovation on the wing: The fascinating world of butterfly colors.* Seminar Series, Department of Neurobiophysics, Rijksuniversiteit Groningen, Groningen, The Netherlands, August, 2006.

Morehouse, N.I. and Ramakrishna, B. *Sustainable partnerships between graduate and K-12 education: Science mentoring outreach as a case study.* Oral presentation, *Partnerships Between STEM Research and K-12 Classrooms Symposium*, AAAS-SWARM 81st Annual Meeting, Tulsa, OK, April, 2006.

Morehouse, N.I. *Ephemeral beauty: Age-related degradation of butterfly coloration.* Oral presentation, *Hexapodium*, Center for Insect Science, University of Arizona, Tucson, AZ, November, 2004.

Morehouse, N.I. *Inquiry-based approaches to local insect populations.* Invited poster presentation, Annual meeting, Western Association of Graduate Schools, Phoenix, AZ, April, 2004.

CONTRIBUTED PRESENTATIONS

Morehouse, N.I. *Female choice, limiting nutrients, genic capture and male butterfly colors.* Oral presentation, Warner Clyde Allee Session, Annual meeting, Animal Behavior Society, Williamsburg, VA, 2010.

**Awarded the Warner Clyde Allee Award

Morehouse, N.I. and Rutowski, R.L. *Female choice for a nitrogen-rich color ornament in a nitrogen limited butterfly.* Oral presentation, 12th International Behavioral Ecology Congress, International Society for Behavioral Ecology, Ithaca, NY, August, 2008.

**Awarded the Pitelka Prize for Best Student Spoken Paper.

Morehouse, N.I., Butler, M.W. and Webber, A. *Community outreach as a core training experience in graduate education.* Poster presentation, Center for the Integration of Research, Teaching, and Learning Forum 2008, University of Wisconsin, Madison, June, 2008.

Morehouse, N.I., Giraldo, M.A., Rutowski, R.L. and Stavenga, D.G. *Diverse color production mechanisms are responsible for convergent blue structural coloration in a butterfly mimicry complex.* Oral presentation, *Iridescence: More Than Meets the Eye*, International conference, Tempe, AZ, February, 2008.

Morehouse, N.I., Giraldo, M.A., Rutowski, R.L. and Stavenga, D.G. *Convergent evolution of blue structural coloration in a butterfly mimicry complex.* Oral presentation, 9th Annual Symposium, Graduates in Earth, Life and Social Sciences, Tempe, AZ, February, 2008.

**Awarded Best Oral Presentation Prize.

CONTRIBUTED PRESENTATIONS (CONT.)

Morehouse, N.I., Rutowski, R.L. and Vukusic, P. *Innovative optics of bright wing colors in pierid butterflies: morphological determinants and implications for use as visual signals*. Oral presentation, Annual Meeting, Society for Integrative and Comparative Biology, Phoenix, AZ, January, 2007.

Morehouse, N.I., and Davis, J.R. *A science mentoring model for partnerships between graduate research communities and public school classrooms*. Poster presentation, Annual Meeting, Society for Integrative and Comparative Biology, Phoenix, AZ, January, 2007.

Morehouse, N.I., Rutowski, R.L. and Vukusic, P. *Pigments as structural colors: Optical properties and evolutionary implications of pterin deposition in pierid butterflies*. Oral presentation, 11th International Behavioral Ecology Congress, International Society for Behavioral Ecology, Tours, France, July, 2006.

Morehouse, N.I., Rutowski, R.L. and Vukusic, P. *Pigments as structural colors: Optical properties and evolutionary implications of pterin deposition in pierid butterflies*. Oral presentation, 7th Annual Symposium, Graduates in Earth Life and Social Sciences, Tempe, AZ, February, 2006.

Morehouse, N.I., Davis, J.R. and Ramakrishna, B. *Sustainable partnerships between graduate and K-12 education: Science mentoring outreach as a case study*. Oral presentation, 7th Annual Symposium, Graduates in Earth Life and Social Sciences, Tempe, AZ, February, 2006.

Morehouse, N.I., Rutowski, R.L. and Vukusic, P. *Pigments as structural colors: Optical properties and evolutionary implications of pterin deposition in pierid butterflies*. Oral presentation, Annual meeting, Animal Behavior Society, Snowbird, UT, August 2005.

Morehouse, N.I. and Rutowski, R.L. *Age-related degradation of butterfly coloration*. Poster session, Annual conference, Arizona Imaging and Microanalysis Society, Tempe, AZ, March, 2005.

Morehouse, N.I. and Rutowski, R.L. *Age-related degradation of butterfly coloration: Causes and implications*, Oral presentation, 6th Annual Symposium, Graduates in Earth Life and Social Sciences, Tempe, AZ, February, 2005.

Morehouse, N.I. and Rutowski, R.L. *Age-related degradation of butterfly coloration*. General poster session, 10th International Behavioral Ecology Congress, International Society for Behavioral Ecology, Jyväskylä, Finland, July 2004.

Morehouse, N.I. *Local buggers: An inquiry-based approach to local insect populations*. Education poster session, Annual meeting, American Association for the Advancement of Science, Seattle, WA, February 2004.

Morehouse, N.I. and Rutowski, R.L. *Age-related degradation of visual signals in the Alfalfa Butterfly (Colias eurytheme)*. General poster session, Annual meeting, Animal Behavior Society, Boise, ID, July 2003.

PRESENTATIONS TO LAY AUDIENCES

Morehouse, N.I. *Bling on the wing: The colorful world of butterflies*. Valley View School, Phoenix, AZ, March, 2007.

Morehouse, N.I. *Flying colors: New insights in to the world of bright butterfly coloration*. Emeritus College Colloquia Series, Arizona State University, February, 2007.

Morehouse, N.I. *Innovation on the wing: the fascinating world of butterfly wing colors*. Oral presentation, Ecology Explorers seminar, Global Institute of Sustainability, Arizona State University, Tempe, AZ, July, 2006.

PRESENTATIONS TO LAY AUDIENCES (CONT.)

Morehouse, N.I. *Insects in the classroom*. Oral presentation, Ecology Explorers seminar, Center for Environmental Studies, Arizona State University, Tempe, AZ, July, 2004.

RESEARCH FUNDING AND FELLOWSHIPS

Marie Curie International Incoming Fellowship, European Union Seventh Research Framework Programme, 2009
International Research Fellowship, National Science Foundation, funding offered but declined, 2009
Travel Grant, International Society for Behavioral Ecology, \$500, 2008
Travel Grant, School of Life Sciences, ASU, \$250, 2008
Travel Grant, Graduate and Professional Students Association, ASU, \$214, 2008
Division of Graduate Studies Dissertation Fellowship, ASU, \$19,000, 2007-2008
Student Research Grant, Animal Behavior Society, \$1,000, 2007
Grant in Aid of Research, Sigma Xi, ASU Chapter, \$400, 2007
Travel Grant, Graduate College, ASU, \$350, 2007
Travel Grant, School of Life Sciences, ASU, \$400, 2007
University Graduate Fellowship, Arizona State University, 2007
Doctoral Dissertation Improvement Grant, National Science Foundation, \$12,000, 2007
Division of Graduate Studies Workshop Grant, ASU, \$2,000, 2007
Frontiers in Life Sciences Workshop Grant, School of Life Sciences, ASU, \$30,000, 2007
Graduate and Professional Students Association Research Grant, ASU, \$2,000, 2006
Faculty Emeriti Fellowship, Preparing Future Faculty Program, ASU, \$1,500, 2006
Preparing Future Faculty Travel Grant, Division of Graduate Studies, ASU, \$300, 2006
University Graduate Fellowship, Arizona State University, 2006
Grant In Aid of Research Award, Sigma Xi, \$500, 2006
Travel Grant, School of Life Sciences, ASU, \$350, 2006
NSF GK-12 Fellowship, Arizona State University, \$15,000, 2005-2006
Travel Grant, School of Life Sciences, ASU, \$350, 2005
NSF Graduate Research Fellowship, Honorable Mention, 2004
Travel Grant, Center for Insect Science, University of Arizona, \$500, 2004
Travel Grant, Graduate College, ASU, \$350, 2004
Travel Grant, School of Life Sciences, ASU, \$350, 2004
Travel Grant, Center for Environmental Studies, ASU, \$900, 2004
NSF GK-12 Fellowship, Arizona State University, \$27,500, 2003-2004
Grant in Aid of Research, Vision Research Award, Sigma Xi, \$2,000, 2003
Travel Grant, Graduate College, ASU, \$350, 2003
Travel Grant, Department of Biology, ASU, \$350, 2003
University Graduate Scholarship, Arizona State University, 2002-2005
Howard Hughes Undergraduate Research Fellowship, Cornell University, 1999

AWARDS AND DISTINCTIONS

Warner Clyde Allee Award, Animal Behavior Society, 2010
Council of Graduate Schools/University Microfilms International Distinguished Dissertation Award Nominee, 2009
Pitelka Prize, International Society for Behavioral Ecology, 2008
Best Oral Presentation, Graduates in Earth Life and Social Sciences Annual Symposium, ASU, 2008
Mentorship Award, Graduate and Professional Students Association, ASU, 2006
Teaching Excellence Award Nominee, Graduate and Professional Students Association, ASU, 2006
Who's Who Among Students in American Universities and Colleges, 2005
Teaching Excellence Award Nominee, Graduate and Professional Students Association, ASU, 2005

AWARDS AND DISTINCTIONS (CONT.)

NSF Partners Paving Pathways Honoree, 2003
Distinction in Research, Cornell University, 2000
Dean's List, Cornell University, 1997-2000
National Merit Scholarship, 1996
Xerox Award for Excellence in the Humanities and Social Sciences, 1996
Valedictorian, C.G. Finney High School, 1996

SERVICE

Symposium Coordinator November 2009 – Present
Integrating Nutritional and Behavioral Ecology: Recent Insights and Future Directions
13th International Behavioral Ecology Congress, ISBE, Perth, Australia, September, 2010

Symposium Coordinator June 2009 – June 2010
Color Signals and Cues in the Lives of Butterflies: Perception, Learning and Function
6th International Conference on the Biology of Butterflies, Edmonton, Canada, July, 2010
www.biology.ualberta.ca/biobutterfly2010/

Steering Committee Member August 2008 – August 2009
WoodStoich 2009
Tohoku University, Sendai, Japan
meme.biology.tohoku.ac.jp/woodstoich/

Program Consultant August 2007 – May 2009
Program Co-Founder/Director October 2004 – August 2007
Graduate Partners in Science Education (GPSE)
School of Life Sciences, Arizona State University, Tempe, AZ
gpse.asu.edu

Entomology Correspondent August 2003 – May 2009
“Ask a Biologist” Science Outreach Program
School of Life Sciences, Arizona State University, Tempe, AZ
askbiologist.asu.edu

Webmaster January 2003 – May 2009
Rutowski Lab
School of Life Sciences, Arizona State University, Tempe, AZ
www.public.asu.edu/~atrlr

Committee Member October 2005 – May 2008
Web Advisory Committee
School of Life Sciences, Arizona State University, Tempe, AZ
sols.asu.edu

Conference Organizer February 2007 – February 2008
Iridescence: More Than Meets the Eye, February 6-9, 2008
Frontiers in Life Sciences Conference Series
School of Life Sciences, Arizona State University, Tempe, AZ
sols.asu.edu/frontiers/2008/

Grant Reviewer September 2007
Graduate and Professional Students Association Research Grant Competition
Arizona State University, Tempe, AZ

Committee Member July 2006 – August 2007
Campus Health Services Advisory Committee
Arizona State University, Tempe, AZ

SERVICE (CONT.)

Committee Member Health and Counseling Student Action Committee Arizona State University, Tempe, AZ	July 2006 – August 2007
Graduate Student Body President Graduate Scholars in the School of Life Sciences School of Life Sciences, Arizona State University, Tempe, AZ	May 2006 – May 2007
Committee Member Undergraduate Programs Committee School of Life Sciences, Arizona State University, Tempe, AZ	January – May 2007
Committee Chair Campus Health Advisory Board, Graduate and Professional Students Association Arizona State University, Tempe, AZ	January – May 2007
Committee Member Graduate Programs Committee School of Life Sciences, Arizona State University, Tempe, AZ	August 2006 – May 2007
Student Mentor/Event Judge Central Arizona Regional Science and Engineering Fair Phoenix Public Schools, Phoenix, AZ	January 2004 – April 2007
Founder and Coordinator Sexual Selection Reading Group School of Life Sciences, Arizona State University, Tempe, AZ	January 2005 – May 2006
Symposium Coordinator Partnerships between STEM Research and K-12 Classrooms AAAS-SWARM 81 st Annual Meeting, Tulsa, OK, April, 2006	October 2005 – April 2006
Committee Member Graduates in Earth, Life and Social Sciences Annual Symposium School of Life Sciences, Arizona State University, Tempe, AZ	August 2002 – August 2006
Coordinator/Webmaster Graduate Student Seminar Series School of Life Sciences, Arizona State University, Tempe, AZ	August 2003 – May 2004
Curriculum/Professional Development NSF Partners Paving Pathways Program Life Cycle of the Butterfly Curriculum Development Gilbert Elementary School District, Gilbert, AZ	June – August 2003

PEER REVIEWER

Advances in Insect Physiology
Advances in the Study of Behavior
Biology Letters
Behavioral Ecology and Sociobiology
Ecological Entomology
Functional Ecology
Journal of the Royal Society Interface
Oecologia

CAREER DEVELOPMENT

Selected Participant

June 2008

Aligning the Preparation of Graduate Students for STEM Early Faculty Careers
Center for Integration of Research, Teaching and Learning Forum 2008, University of
Wisconsin, Madison

Selected Participant

August 2005 – May 2007

Preparing Future Faculty Program
Division of Graduate Studies, Arizona State University, Tempe, AZ

PROFESSIONAL SOCIETY MEMBERSHIPS

American Association for the Advancement of Science
American Society of Naturalists
Animal Behavior Society
International Society for Behavioural Ecology
Lepidopterists' Society
Sigma Xi, The Scientific Research Society
Xerces Society for Invertebrate Conservation