

CURRICULUM VITAE

John H. Graham

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RESIDENCE

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PERSONAL

Born 21 February 1949 in Long Island City, New York
Married to Catherine Chamberlin.

ACADEMIC PERFORMANCE STATISTICS

Google Scholar - h-index = 31, 3,146 citations/73 pubs, academic age = 30 years

ResearchGate - RG score = 34.33 (92.5% percentile), 2,456+ reads/downloads, 2,588 citations/98 pubs

ACADEMIC AND TEACHING EXPERIENCE

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| 2002-present | Reid Professor of Biology |
| 2004-2007 | Chair of the Biology Department, Berry College |
| 2001 | Full Professor at Berry College. I teach Genetics, Evolutionary Biology, Seminar in Biology, and Biological Diversity (non-majors). I have also taught Biostatistics, Cell Biology, Biotechnology, Foundations of Modern Biology (honors), Developmental Population Biology, and seminar courses on Chaos and Complexity in Biology, The Biology of Dinosaurs, Cholesterol, Dietary Fat, and Coronary Heart Disease, and Human Origins and Evolution. |
| 1994-2001 | Associate Professor at Berry College. |

- 1989-1994 Assistant Professor at Berry College.
- 1988 Postdoctoral Research Associate at Wayne State University. Principal Investigator on two NSF grants.
- 1987 Adjunct Professor at College of New Jersey, Trenton, NJ. I taught Anatomy and Physiology.
- Assistant Examiner at Educational Testing Service. I composed questions for the verbal part of the Graduate Record Exam.
- 1985-1986 Acting Assistant Professor of Biology, Rider College, Lawrenceville, NJ. I taught Ecology, Zoology, Plant and Environmental Science, and Scientific Report Writing.
- 1978-1981 Caretaker of William L. Hutcheson Memorial Forest (Rutgers University). I gave educational public tours and manned the National Weather Service station at East Millstone.
- 1978-1980 Teaching Assistant, Rutgers University, New Brunswick, NJ. I taught labs in Ecology, Limnology, and General Biology.
- 1974-1977 Teaching Assistant, Rutgers University, Camden, NJ. I taught labs in General Physiology, and General Biology.

EDUCATION

- 1986 Ph.D. in Ecology, Rutgers University, New Brunswick
- 1978 M.Sc. in Biology, Rutgers University, Camden
- 1971 B.A. in Biology, Rutgers University, Camden

OTHER PROFESSIONAL EXPERIENCE

- 2016-present Associate editor for *Symmetry*, an international, open access journal covering research on symmetry phenomena wherever they occur in mathematical and scientific studies. *Symmetry* is published monthly online by MDPI
- 2008-present Associate Editor for *Genetica*, an international journal publishing papers dealing with genetics, population dynamics, and evolution
- 2007 NSF Advisory Panel, Evolutionary and Population Ecology, Arlington, VA (I reviewed 17 grant proposals)
- 1992 Research expedition to Bryansk Region, Russia to study developmental instability of organisms exposed to low level radiation from Chernobyl.
- Research expedition to Novgorod, Russia to study developmental instability of organisms living near Azot chemical production facility.

- 1991 Research expedition to Odessa, Ukraine, USSR to study developmental instability of organisms living near an ammonia production and storage facility.
- Incorporator and member of Board of Directors of the International Biotest Foundation.
- 1987 Part-time editorial work for The Society for the Study of Evolution.
- 1978-79 Old-Field Botanical Survey. William L. Hutcheson Memorial Forest.
- 1977 Environmental Impact Statement for Township of Wenonah, NJ.
- 1979 Limnological consultant to Dames and Moore, Inc.

COURSES QUALIFIED TO TEACH

Evolution	Ichthyology	Principles of Zoology
Ecology	Aquatic Ecology	General Biology
Population Genetics	Biometrics	Scientific Report Writing
Genetics	Population Ecology	Limnology
Community Ecology	Vertebrate Zoology	

ADDITIONAL EXPERIENCE

Electrophoresis of nucleic acids and proteins
 Isolation of high molecular weight DNA and plasmid isolation
 Labeling DNA (both nick translation and random primer)
 DNA hybridization with both ³²P-labeled and biotinylated probes
 DNA cloning, and transformation of bacteria
 Methods in nonlinear dynamics and fractal geometry
 Mathematical modeling
 Fortran and Basic programming
 Experimental design and statistical data analysis, including Generalized Linear Models
 Extensive experience with SAS, SPSS, and R

PROFESSIONAL AFFILIATIONS

American Association for the Advancement of Science
 Society for the Study of Evolution
 Ecological Society of America
 American Society of Ichthyologists and Herpetologists
 Sigma Xi

AWARDS

- 2002 Reid Professor of Biology
Sabbatical for Fall 2002
- 2000 Mary S. and Samuel Poe Carden Award for outstanding teaching, scholarship, and service
- 1988 Nominated for best paper of the year in *Transactions of the American Fisheries Society*

GRANTS

- 2012 Do Environmental Stressors Promote Fluctuating Asymmetry in Eastern Bluebird Nestlings? Laura Maddox Smith Summer Research Grant for the Environmental Sciences, \$5,000 (with Renee Carleton and two students)
- 1998 Development of ecological indicator guilds for land management. United States Department of the Army, Strategic Environmental Research and Development Program (SERDP), \$ 1.9 million for 5 years (with collaborators at other institutions)
- 1996 Asymmetry dose-responses in *Drosophila*. International Biotest Foundation, \$7,568
- 1995 Faculty development grant, Berry College, \$750
Faculty travel grant, Berry College, \$750
- 1994 Biological Integrity of Silver Creek. City of Rome and Georgia Environmental Protection Division, \$5,426
Faculty development grant, Berry College, \$750
- 1993 Faculty development grant, Berry College, \$1000
Faculty development grant, Berry College, \$750
- 1992 Bryansk Project, Russian Academy of Sciences, transportation and full support for two weeks in the field
Novgorod Project, INTELMAS, \$1200, 2000 rubles, and full support for two weeks
Faculty development grant, Berry College, \$1,000
- 1991 Odessa Project, INTELMAS (Soviet-American Joint Venture), \$2,100, 2000 rubles, and full support for three weeks
Faculty development grant, Berry College, \$1,000
- 1990 Faculty development grant, Berry College, \$750
- 1989 Faculty development grant, Berry College, \$750

1988-89 The Northern Flicker Hybrid Zone (with W. Moore), National Science Foundation (BSR-875374)

Morphological versus Molecular Data in Reconstructing Phylogeny of Picinae (with W. Moore and M. Tennant), National Science Foundation (BSR-8800934)

1979-81 Anne B. and James H. Leathem Fund, Rutgers University

1979 Steinetz Fund, Rutgers University

GRANT PROPOSALS

1996 An ecological test of hybrid zone theory (with D. C. Freeman, E. D. McArthur, and E. Golenberg). Submitted to National Science Foundation. \$738,052 (not funded)

1995 An ecological test of hybrid zone theory (with D. C. Freeman and E. D. McArthur). Submitted to National Science Foundation. \$404,256 (not funded)

1994 Developmental stability: a sensitive, in situ measure of aquatic ecosystem stress using indigenous species (with D. C. Freeman and R. A. Hough). Resubmitted to Environmental Protection Agency. \$392,226 (not funded)

Developmental instability: a new approach for assessing the impact of chemical stressors on threatened and endangered species (with D. C. Freeman and M. J. Hooper). Submitted to US Army Corps of Engineers. \$273,284 (not funded)

1993 Developmental instability as a measure of environmental stress (with D. C. Freeman, B. Wachocki, and M. Sondossi). Submitted to Environmental Protection Agency for \$211,028 (not funded).

Developmental stability: a sensitive in situ measure of aquatic ecosystem stress using indigenous species (with D. C. Freeman and T. Hough). Submitted to Environmental Protection Agency for \$152,000 (not funded).

1991 Developmental instability as a measure of environmental stress (with D. C. Freeman, J. M. Emlen, and B. West). Submitted to Environmental Protection Agency for \$200,000 (not funded).

1990 Reciprocal transplant studies in a plant hybrid zone, (with D. C. Freeman, E. D. McArthur, and W. Turner). Submitted to National Science Foundation for \$474,000 (not funded).

THESIS RESEARCH

Ph.D. Niche ontogeny and progressive deviation in two congeneric sunfishes, *Enneacanthus gloriosus* and *E. obesus* (Centrarchidae). October 1986.

M.Sc. Factors affecting the distribution of sunfishes in southern New Jersey. May 1978.

PUBLICATIONS

- Graham, J.H. and B. Ozener. 2016. Fluctuating asymmetry of human populations: a review. *Symmetry* 8(12), 154; doi:10.3390/sym8120154
- Graham, J.H., Whitesell, M.J., Fleming II, M., Hel-Or, H., Nevo, E., Raz, S. 2015. Fluctuating asymmetry of plant leaves: Batch processing with LAMINA and Continuous Symmetry Measures. *Symmetry* 7(1):255-268.
- de Bruin, E.I., J.H. Graham, A. Louwse, and A.C. Huizink. 2014. Mild dermatoglyphic deviations in autistic teenagers of average intellectual ability as compared to normal controls. *Autism Research and Treatment* 2014, Article ID 968134, 6 pages. <http://dx.doi.org/10.1155/2014/968134>
- Özener, B. and J.H. Graham. 2014. Growth and fluctuating asymmetry of human newborns: influence of inbreeding and parental education. *American Journal of Physical Anthropology* 153: 45-51.
- Graham, J.H., D. Robb, and A.R. Poe. 2012. Random phenotypic variation in *Saccharomyces cerevisiae* fits a double Pareto-lognormal distribution. *PLoS One* 7(11): e48964. doi:10.1371/journal.pone.0048964
- Raz, S., N.P. Schwartz, H.K. Mienis, E. Nevo E, and J.H. Graham. 2012. Fluctuating helical asymmetry and morphology of snails (Gastropoda) in divergent microhabitats at 'Evolution Canyons I and II,' Israel. *PLoS One* 7(7): e41840. doi:10.1371/journal.pone.0041840
- Raz, S., J.H. Graham, A. Cohen, B.L. de Bivort, I. Grishkan, and E. Nevo. 2012. Growth and asymmetry of soil microfungus colonies from "Evolution Canyon," Lower Nahal Oren, Mount Carmel, Israel. *PLoS One* 7(4): e34689. doi:10.1371/journal.pone.0034689
- Graham, J.H., J.J. Duda, M.L. Brown, S. Kitchen, J.M. Emlen, J. Malol, E. Bankstahl, A.J. Krzysik, H. Balbach, D.C. Freeman. 2012. The effects of drought and disturbance on the growth and developmental instability of loblolly pine (*Pinus taeda* L.). *Ecological Indicators* 20: 143–150.
- Graham, J.H. and Duda, J.J. 2011. The hump-backed species richness curve: a contingent rule for community ecology. *International Journal of Ecology* 2011, article ID 868426, pages 1-15, doi: 10.1155/2011/868426.
- Ostberg, C.O., Duda, J.J., Graham, J.H., Zhang, S., Haywood, K.P. III, Miller, B., and Lerud, T. L. 2011. Growth, morphology, and developmental instability of rainbow trout, Yellowstone cutthroat trout, and four hybrid generations. *Transactions of the American Fisheries Society* 140: 334 — 344.
- Raz, S., J.H. Graham, H. Hel-Or, H., T. Pavličec, and E. Nevo. 2011. Developmental instability of vascular plants in contrasting microclimates at "Evolution Canyon." *Biological Journal of the Linnean Society*, doi: 10.1111/j.1095-8312.2011.01615.x
- Graham, J.H., S. Raz, H. Hel-Or, and E. Nevo. 2010. Fluctuating asymmetry: methods, theory, and applications. *Symmetry* 2: 466-540.
- Graham, J. H., A. J. Krzysik, D. A. Kovacic, J. J. Duda, D. C. Freeman, J. M. Emlen, J. C. Zak, W. R. Long, M.P. Wallace, C. Chamberlin-Graham, J. Nutter, and H. Balbach. 2009. Species richness, equitability, and abundance of ants in disturbed landscapes. *Ecological Indicators* 9: 866-877.
- Лайус, Д. Л., Грэм, Д. Х., Католикова, М. В., и Юрцева, А. О. 2009. Флуктуирующая асимметрия и случайная фенотипическая изменчивость в популяционных исследованиях: история, достижения, проблемы, перспективы. *Вестник Санкт-Петербургского Университета* 3: 98-110. [Lajus, D.L., Graham, J.H., Katolikova, M.V., and Yurtseva, A. O. Fluctuating asymmetry

and random phenotypic variation: history, achievements, problems, perspectives. Bulletin of Saint-Petersburg University 3: 98–110.]

- Graham, J. H., A. J. Krzysik, D. A. Kovacic, J. J. Duda, D. C. Freeman, J. M. Emlen, J. C. Zak, W. R. Long, M.P. Wallace, C. Chamberlin-Graham, J. Nutter, and H. Balbach. 2008. Ant community composition across a gradient of disturbed military landscapes at Fort Benning, Georgia. *Southeastern Naturalist* 7: 429-448.
- Miglia, K. J., E. D. McArthur, W. Moore, H. Wang, J. H. Graham, and D. C. Freeman. 2005. Nine-year reciprocal transplant experiment in the gardens of the basin and mountain big sagebrush (*Artemisia tridentata*: Asteraceae) hybrid zone of Salt Creek Canyon: the importance of multiple-year tracking of fitness. *Biological Journal of the Linnean Society* 86: 213-225.
- Freeman, D. C., M. L. Brown, J. J. Duda, J. H. Graham, J. M. Emlen, A. J. Krzysik, H. Balbach, D. A. Kovacic, and J. C. Zak. 2005. Leaf fluctuating asymmetry, soil disturbance and plant stress: a multiple year comparison using two herbs, *Ipomoea pandurata* and *Cnidioscolus stimulosus*. *Ecological Indicators* 5: 85-95.
- Krzysik, A.J., H.E. Balbach, D. Kovacic, J. Zak, J.H. Graham, M. Wallace, J. Duda, D.C. Freeman, and J.M. Emlen. 2005. Development of ecological indicator guilds: a site comparison index for the southeast Fall-Line Sandhills. Miscellaneous Publication, SERDP Research Project CS-1114B, SERDP Program Office, Arlington, VA.
- Graham, J.H., H.H. Hughie, S. Jones, K. Wrinn, A.J. Krzysik, J.J. Duda, D.C. Freeman, J.M. Emlen, J.C. Zak, D.A. Kovacic, C. Chamberlin-Graham, and H.E. Balbach. 2004. Habitat disturbance and the diversity and abundance of ants (Formicidae) in the Southeastern Fall-Line Sandhills. *Journal of Insect Science* (online at <http://jinsectscience.oxfordjournals.org/content/jis/4/1/30.full.pdf>)
- Freeman, D. C., M. L. Brown, J. J. Duda, J. H. Graham, J. M. Emlen, A. Krzysik, H. Balbach, D. Kovacic, and J. C. Zak. 2004. Developmental instability in *Rhus copallinum* L.: multiple stressors, years, and responses. *International Journal of Plant Sciences* 165: 53-63.
- Freeman, D. C., M. L. Brown, J. J. Duda, J. H. Graham, J. M. Emlen, A. J. Krzysik, H. E. Balbach, D. A. Kovacic, and J. C. Zak. 2004. Photosynthesis and fluctuating asymmetry as indicators of plant responses to soil disturbance in the Fall Line Sandhills of Georgia: a case study using *Rhus copallinum* and *Ipomoea pandurata*. *International Journal of Plant Sciences*. 165: 805-816.
- Duda, J.J., D.C. Freeman, M. Brown, J.M. Emlen, J.H. Graham, A.J. Krzysik, J.C. Zak, and D.A. Kovacic. 2004. Estimating disturbance effects from military training using developmental instability and physiological measures of plant stress. *Ecological Indicators*. 3: 252-262.
- Graham, J. H., Shimizu, K., J. M. Emlen, D. C. Freeman, and J. Merkel. 2003. Growth models and the expected distribution of fluctuating asymmetry. *Biological Journal of the Linnean Society* 80: 57-65.
- Freeman, D. C., M. L. Brown, M. Dobson, Y. Jordan, A. Kizy, C. Micallef, L. C. Hancock, J. H. Graham, and J. M. Emlen. 2003. Developmental Instability: Measures of resistance and resilience using pumpkin (*Cucurbita pepo*). *Biological Journal of the Linnean Society* 78: 27–41.
- Emlen, J. M., D. C. Freeman, and J. H. Graham. 2003. The Adaptive Basis of Developmental Instability: A Hypothesis and its Implications. Pages 51–61 *In*: Polak M (ed) *Developmental instability: causes and consequences*. Oxford University Press, New York.
- Freeman, D. C., J. H. Graham, J. M. Emlen, M. A. Tracy, R. A. Hough, C. L. Alados, and J. Escós. 2003. Plant Developmental Instability: New Measures, Applications, and Regulation. Pages 367–386 *In*: Polak M (ed) *Developmental instability: causes and consequences*. Oxford University Press, New York

- Graham, J. H., J. M. Emlen, and D. C. Freeman. 2003. Nonlinear dynamics and developmental instability. Pages 35-50 *In*: Polak M (ed) *Developmental instability: causes and consequences*. Oxford University Press, New York
- Lajus, D. L., J. H. Graham, and A. V. Kozhara. 2003. Developmental instability and the stochastic component of total phenotypic variance. Pages 343-363 *In*: Polak M (ed) *Developmental instability: causes and consequences*. Oxford University Press, New York.
- Tracy, M., D. C. Freeman, J. J. Duda, K. J. Miglia, J. H. Graham, R. A. Hough. 2003. Developmental instability: An appropriate indicator of plant fitness? Pages 196-212 *In*: Polak M (ed) *Developmental instability: causes and consequences*. Oxford University Press, New York.
- Graham, J. H., E. D. McArthur, and D. C. Freeman. 2001. Narrow hybrid zone between two subspecies of big sagebrush (*Artemisia tridentata*: Asteraceae): XII. Galls on sagebrush in a reciprocal transplant garden. *Oecologia* 126: 239-246.
- Graham, J. H., E. D. McArthur, and D. C. Freeman. 2001. Narrow hybrid zone between two subspecies of big sagebrush (*Artemisia tridentata*: Asteraceae): XI. Plant-insect interactions in reciprocal transplant gardens. Pages 118-126 in E. D. McArthur and J Daniel (eds) *Proceedings: Shrubland ecosystem genetics and biodiversity*, June 13-15, 2000, Provo, Utah; USDA Forest Service Proceedings RMRS-P-21. Ogden, Utah.
- Freeman, D. C., J. H. Graham, T. Jones. H. Wang, K. J. Miglia, and E. D. McArthur. 2001. Use of distance measures to assess environmental and genetic variability across sagebrush hybrid zones. Pages 127-133 in E. D. McArthur and J Daniel (eds) *Proceedings: Shrubland ecosystem genetics and biodiversity*, June 13-15, 2000, Provo, Utah; USDA Forest Service Proceedings RMRS-P-21. Ogden, Utah.
- Graham, J. H., D. Fletcher, J. Tighe, and M. McDonald. 2000. Growth and developmental stability of *Drosophila melanogaster* in low-frequency magnetic fields. *Bioelectromagnetics* 21: 465-472.
- Graham, J. H., D. C. Freeman, H. Wang, and E. D. McArthur. 1999. Ecological analysis of the big sagebrush hybrid zone. Pages 11-14 in E. D. McArthur, W. K. Ostler, and C. L. Wambolt, eds., *USDA Forest Service Proceedings: Shrubland Ecotones*, August 12-14, 1998, Ephraim, Utah; USDA Forest Service Proceedings RMRS-P-11, Ogden, Utah.
- Freeman, D. C., K. J. Miglia, E. D. McArthur, J. H. Graham, and H. Wang. 1999. Narrow hybrid zone between two subspecies of big sagebrush (*Artemisia tridentata*: Asteraceae): X. Performance in reciprocal transplant gardens. Pages 15-24 in E. D. McArthur, W. K. Ostler, and C. L. Wambolt, eds., *USDA Forest Service Proceedings: Shrubland Ecotones*, August 12-14, 1998, Ephraim, Utah; USDA Forest Service Proceedings RMRS-P-11, Ogden, Utah.
- Freeman, D. C., J. H. Graham, M. Tracy, J. M. Emlen, and C. L. Alados. 1999. Developmental instability as a means of assessing stress in plants: a case study using electromagnetic fields and soybeans. *International Journal of Plant Sciences* 160(6 suppl.): S157-S166.
- Cowart, N. M. and J. H. Graham. 1999. Within- and among-individual fluctuating asymmetry of leaves in the fig (*Ficus carica* L.). *International Journal of Plant Sciences* 160: 116-121.
- Byrd, D. W., E. D. McArthur, H. Wang, J. H. Graham, and D. C. Freeman. 1999. Narrow hybrid zone between two subspecies of big sagebrush (*Artemisia tridentata*: Asteraceae). VIII. Spatial and temporal patterns of terpenes. *Biochemical Systematics and Ecology* 27: 11-25.
- Graham, J. H., J. M. Emlen, D. C. Freeman, L. J. Leamy, and J. Kieser. 1998. Directional asymmetry and

- the measurement of developmental instability. *Biological Journal of the Linnean Society* 64: 1-16.
- Emlen, J. M., D. C. Freeman, A. Mills, and J. H. Graham. 1998. How organisms do the right thing: the attractor hypothesis. *Chaos* 8: 717-726.
- McArthur, E. D., D. C. Freeman, J. H. Graham, H. Wang, S. C. Sanderson, T. A. Monaco, B. N. Smith. 1998. Narrow hybrid zone between two subspecies of big sagebrush (*Artemisia tridentata*: Asteraceae). VI. Respiration and water potential. *Canadian Journal of Botany* 76: 567-574.
- Wang, H. D., W. Byrd, J. L. Howard, E. D. McArthur, J. H. Graham, and D. C. Freeman. 1998. Narrow hybrid zone between two subspecies of big sagebrush (*Artemisia tridentata*: Asteraceae). V. Soil properties. *International Journal of Plant Science* 159: 139-147.
- Wang, H., E. D. McArthur, J. H. Graham, and D. C. Freeman. 1997. Narrow hybrid zone between two subspecies of big sagebrush (*Artemisia tridentata*: Asteraceae). IV. Reciprocal transplant experiments. *Evolution* 51: 95-102.
- Freeman, D. C., J. M. Emlen, J. H. Graham, R. L. Mara, and M. Tracy. 1996. Developmental instability as a bioindicator of ecosystem health. Pages 170-177 In G. R. Barrow, E. D. McArthur, R. Sosebee, and R. Tausch, *Proceedings: Shrubland Ecosystem Dynamics in a Changing Environment*, Las Cruces, NM.
- Tracy, M., D. C. Freeman, J. M. Emlen, J. H. Graham, and R. A. Hough. 1995. Developmental instability as a biomonitor of environmental stress: an illustration using aquatic vegetation. Pages 313-337 In F. M. Butterworth (editor), *Biomonitoring and Biomarkers as Indicators of Environmental Change*. Plenum Press, NY.
- Freeman, D. C., J. H. Graham, D. W. Byrd, E. D. McArthur, and W. D. Turner. 1995. Narrow hybrid zone between two subspecies of big sagebrush (*Artemisia tridentata*: Asteraceae). III. Developmental instability. *American Journal of Botany* 82: 1144-1152.
- Graham, J. H., D. C. Freeman, and E. D. McArthur. 1995. Narrow hybrid zone between two subspecies of big sagebrush (*Artemisia tridentata*: Asteraceae). II. Selection gradients and hybrid fitness. *American Journal of Botany* 82: 709-716.
- Freeman, D. C., J. M. Emlen, J. H. Graham, R. A. Hough, and T. A. Bannon. 1994. Biological monitoring of environmental quality: the use of developmental instability. *Journal of Environmental Engineering and Management*. Summer 1994, pp. 6-11.
- Graham, J. H., D. C. Freeman, and J. M. Emlen. 1993. Developmental stability: a sensitive indicator of populations under stress. Pages 136-158 In *First Symposium Environmental Toxicology and Risk Assessment*, ASTM STP 1179, W. G. Landis, J. Hughes, and M. A. Lewis (editors), American Society for Testing and Materials, Philadelphia.
- Graham, J. H., K. Roe, and T. B. West. 1993. Developmental instability of *Drosophila melanogaster* exposed to lead and benzene. *Ecotoxicology* 2: 185-194.
- Graham, J. G., J. M. Emlen, and D. C. Freeman. 1993. Developmental stability and its applications in ecotoxicology. *Ecotoxicology* 2: 175-184.
- Graham, J. H., D. C. Freeman, and J. M. Emlen. 1993. Antisymmetry, directional asymmetry, and dynamic morphogenesis. Pages 123-139 In T. Markow (editor), *Developmental Instability: Origins and Evolutionary Significance*. Kluwer, Dordrecht, The Netherlands. (also published in a special issue of *Genetica*)
- Freeman, D. C., J. H. Graham, and J. M. Emlen. 1993. Developmental stability in plants: symmetries, stress, and epigenesis. Pages 99-121 In T. Markow (editor), *Developmental Instability: Origins*

- and Evolutionary Significance. Kluwer, Dordrecht, The Netherlands. (also published in *Genetica*)
- Emlen, J. M., D. C. Freeman, and J. H. Graham. 1993. Nonlinear growth dynamics and the origin of fluctuating asymmetry. Pages 79-96 In T. Markow (editor), *Developmental Instability: Origins and Evolutionary Significance*. Kluwer, Dordrecht, The Netherlands. (also published in a special issue of *Genetica*)
- Graham, J. H. 1993. Species diversity of fishes in naturally acidic lakes of New Jersey. *Transactions of the American Fisheries Society* 122: 1043-1057.
- Graham, J. H. 1992. Genomic coadaptation and developmental stability in hybrid zones. *Acta Zoologica Fennica* 191: 121-131.
- Zakharov, V. M. and J. H. Graham (editors). 1992. Developmental stability in natural populations. *Acta Zoologica Fennica* 191: 1-200.
- Graham, J. H. and V. M. Zakharov. 1992. Introduction. *Acta Zoologica Fennica* 191: 4-5.
- Moore, W. S., J. H. Graham, and J. Price. 1991. Mitochondrial DNA variation in the Northern Flicker (*Colaptes auratus*). *Molecular Biology and Evolution* 8: 327-344.
- Freeman, D.C., W. A. Turner, E. D. McArthur, and J. H. Graham. 1991. The characterization of a narrow hybrid zone between two subspecies of Big Sagebrush (*Artemisia tridentata tridentata* and *A. t. vaseyana*). *American Journal of Botany* 78: 805-815.
- Graham, J. H. 1989. Foraging by sunfishes in a bog lake. Pages 517-527 In R. Sharitz and J. W. Gibbons (editors). *Freshwater wetlands and wildlife*. DOE Symposium Series No. 61, USDOE Office of Scientific and Technical Information, Oak Ridge, Tennessee.
- Graham, J. H. and R. C. Vrijenhoek. 1988. Detrended correspondence analysis of dietary data. *Transactions of the American Fisheries Society* 117: 29-36.
- Graham, J. H. and J. D. Felley. 1985. Genomic coadaptation and developmental stability within introgressed populations of *Enneacanthus gloriosus* and *E. obesus* (Pisces, Centrarchidae). *Evolution* 39: 104-114.
- Dawley, R. M., J. H. Graham, and R. J. Schultz. 1985. Triploid progeny of pumpkinseed x green sunfish hybrids. *The Journal of Heredity* 76: 251-257.
- Graham, J. H. and R. W. Hastings. 1984. Distributional patterns of sunfishes on the New Jersey Coastal Plain. *Environmental Biology of Fishes* 10: 137-148.

PUBLISHED ABSTRACTS

- Glass, K.A., and Graham, J.H. 2000. Fluctuating asymmetry and developmental noise during leaf expansion in the pumpkin *Cucurbita pepo*. *Association of Southeastern Biologists Bulletin* 47: 128
- Graham, J. H. and J. D. Felley. 1983. Developmental stability and genomic coadaptation in hybrid sunfish. *American Zoologist* 23: 966.
- Graham, J. H. and R. W. Hastings. 1980. The impact of agriculture on blackwater fish communities in the New Jersey pine barrens. *Bulletin of the New Jersey Academy of Sciences* 25: 62.

Graham, J. H. and R. W. Hastings. 1980. Resource partitioning among five sunfish species. *Bulletin of the New Jersey Academy of Sciences* 25: 62.

BOOK REVIEWS

Graham, J. H. 2000. Accounts of species on the threshold of extinction. (Book review of *Watching, from the edge of extinction* by Beverly Peterson Stearns and Stephen C. Stearns). *Ecology* 81: 291-292.

Graham, J. H. 1997. Life History of Biology. (book review of Ernst Mayr's *This is Biology*). *Ecology* 78: 2273-2274.

SUBMITTED MANUSCRIPTS AND MANUSCRIPTS IN PREPARATION

Graham, J.H. and B. Ozener. Fluctuating asymmetry in human populations. (in preparation)

Carleton, R.E, J.H. Graham, A. Lee, and Z. Taylor. Drought negatively affects Eastern Bluebird reproduction. (in preparation).

Graham, J.H., H. Oxner, K. Haney, L. Tarpley, C.J. Creamer, R.A. McCollum, and A. Poe. RNAi silencing of *Acetylcholinesterase*, *amnesiac*, *pannier*, and *Hairless* influences fluctuating asymmetry of sensory bristles in *Drosophila melanogaster*. (in preparation)

INVITED SYMPOSIA AND ORGANIZED SESSIONS

2009 Graham, J.H., C. Ostberg, and J.D. Duda. Fluctuating asymmetry of hybrid rainbow and Yellowstone cutthroat trout. Western Fisheries Research Center, Seattle, Washington. June 2009.

2005 Kovacic, D.A., A.J. Krzysik, J.C. Zak, D.C. Freeman, J.H. Graham, and J.J. Duda. Soil nutrient flux as an indicator of ecological disturbance. Organized Oral Session: Ecological Indicators at Multiple Scales. Annual Meeting of the Ecological Society of America and The International Congress of Ecology, Montreal, Quebec, Canada, 11 August (Oral by Kovacic)

Krzysik, A. J., H. E. Balbach, D. A. Kovacic, J. H. Graham, M. P. Wallace, J. J. Duda, J. C. Zak, D. C. Freeman, J. M. Emlen. The relation between landscape disturbance and biodiversity using ecological indicators and a site comparison index. Symposium: Plants as indicators in biodiversity and ecological monitoring. XVII International Botanical Congress, Vienna, Austria 17-23 July (Oral by Balbach)

2004 McArthur, E. D., D. C. Freeman, J. H. Graham, and S. C. Sanderson. The role of hybridization and genetics in landscape dominant sagebrushes (*Artemisia*). XXII International Congress of Entomology, 15-21 August 2004, Brisbane, Queensland, Australia.

2000 Eleventh Wildland Shrub Symposium, June 2000 at Brigham Young University, Utah

1998 Tenth Wildland Shrub Symposium, August 1998 at Snow College, Ephraim, Utah

1996 Workshop on developmental stability, September 1996 in Gilleleje, Denmark, hosted by Anders Møller and Paul Brakefield; all expenses paid by European Science Foundation

1995 Symposium on New Methods of Population Study, hosted by Alexei Yablokov and Vladimir

- Zakharov. October 1995, Moscow, Russia.
- 1993 Developmental Instability: Its Origins and Evolutionary Significance. June 1993, Tempe, Arizona.
- 1992 Freeman, D. C., W. Rothschild, J. M. Emlen, J. H. Graham, M. Tracy, and S. Kanchana. Fractals, Developmental Stability, and Environmental Stress. Gordon Research Conference on Fractals, Plymouth Station College, June 8-12.
- 1991 Second Biotest Symposium. Helsinki, Finland.
- ASTM Environmental Toxicology and Risk Assessment Symposium. Atlantic City, NJ.
- 1990 Biotest: Evaluating the Condition of Natural Environments. USSR Academy of Sciences, Moscow, USSR.
- 1989 Population Phenogenetics: Developmental Stability in Natural Populations. USSR Academy of Sciences, Moscow, USSR.
- 1986 Freshwater Wetlands and Wildlife Symposium, Charleston, South Carolina.

PRESENTATIONS OF RESEARCH

- 2015 Whitesell, M.J., H. Hel-Or, S. Raz, and J.H. Graham. Fluctuating asymmetry of plant leaves using Continuous Symmetry Measures. Southeastern Ecology and Evolution Conference (SEEC), University of Georgia, Athens, GA, March 13–15 2015. (Oral by Whitesell)
- 2014 Graham, J.H., M.J. Whitesell, M. Fleming II, H. Hel-Or, E. Nevo, S. Raz. Fluctuating asymmetry of plant leaves: Batch processing with LAMINA and Continuous Symmetry Measures. University of North Carolina at Charlotte, 10 October 2014 (Oral by Graham)
- Whitesell, M.J. and J.H. Graham. Herbivore damage and leaf asymmetry in invasive and native plant species. Berry College Symposium on Student Scholarship, 8 April 2014. (Oral by Whitesell)
- 2013 Creamer, C.J., R.A. McCollum, H.N. Oxner, and J.H. Graham. RNAi silencing of neurotransmitters and their degradative enzymes modifies fluctuating asymmetry of sensory bristles in *Drosophila melanogaster*. Berry College Symposium on Student Scholarship, April 2013. (Oral by Creamer, McCollum, and Oxner)
- Fleming, M. II and J.H. Graham. Distribution of phenotypic variation in *Ligustrum sinense* (Chinese Privet). Berry College Symposium on Student Scholarship, April 2013. (Oral by Fleming)
- 2012 Haney, K.M., L.E. Tarpley, H.N. Oxner, M.M. Shadid, and J.H. Graham. RNA interference uncovers genes influencing developmental instability of sensory bristles in *Drosophila melanogaster*. Berry College Symposium on Student Scholarship, April 2012. (Oral by Haney, Tarpley, and Oxner)
- 2011 Graham, J.H., A. Poe, L. Tarpley, S. Lanning, and N. Schwartz. RNAi silencing of neurotransmitters and their degradative enzymes increases fluctuating asymmetry of sensory

- bristles in *Drosophila melanogaster*. Annual Meeting of the Society for the Study of Evolution, Norman, OK. 17-21 June 2011 (Oral by Graham)
- Raz, S., J.H. Graham, H. Hel-Or, T. Pavlíček, and E. Nevo. Environmental stress and fluctuating asymmetry of vascular plants in contrasting microclimates at “Evolution Canyon.” 6th FISEB, Federation of the Israel Societies for Experimental Biology, Eilat, Israel, 7-10 February 2011 (poster by Raz)
- Tyler, B.D. and J.H. Graham. Observations on the morphology and natural history of the spider genus *Sphodros* (Araneae: Mygalomorphae: Atypidae) at the Chattahoochee River National Recreation Area. Berry College Symposium on Student Scholarship, April 2011 (Oral by Tyler)
- 2010 Graham, J.H., A. Poe, J. Blalock, S. Cassell, and D. Robb. Origins of developmental instability in transgenic RNAi lines of *Drosophila melanogaster*. Annual Meeting of the Society for the Study of Evolution, Portland, OR. 25-29 June 2010 (Oral by Graham)
- Tyler, B.D. and J.H. Graham. Spider (Araneae) biodiversity of the Berry College campus. Berry College Symposium on Student Scholarship, April 2010 (Poster by Tyler)
- 2009 Raz, S., J.H. Graham, H. Hel-Or, T. Pavlíček, and E. Nevo. Developmental instability of eight plant species in divergent microclimates at “Evolution Canyon,” Mount Carmel, Israel. Annual Meeting of the Society for the Study of Evolution, Moscow, Idaho. 12-16 June 2009 (oral by Graham)
- Tyler, B.D, J. Blalock, G.S. Cassell, and J.H. Graham. Spider (Araneae) biodiversity of the Berry College campus. Berry College Symposium on Student Scholarship, April 2009 (Poster by Tyler)
- 2008 Graham, J.H., J.J. Duda, C. Ostberg, S. Zhang, K.P. Haywood III, and B. Miller. Growth, Morphology, and Developmental Instability of Hybrid Trout, *Oncorhynchus mykiss* and *O. clarki bouvieri*. Annual Meeting of the Society for the Study of Evolution, Minneapolis, MN. 21-25 June 2008 (Oral by Graham)
- Graham J.H., A.J. Krzysik, D.A. Kovacic, J.J. Duda, D.C. Freeman, J.M Emlen, J. Zak, W.R. Long, M. Wallace, C.C. Chamberlin-Graham, J. Nutter, and, H.E. Balbach. Ants as indicators of landscape disturbance at Fort Benning. Association of Southeastern Biologists, Spartanburg, SC. 16-19 April 2008 (Oral by Graham)
- 2006 Ostberg, C. O., J. J. Duda, J. H. Graham, K. P. Haywood III, S. Zhang, B. Miller. Experimental analysis of growth and developmental instability on two Yellowstone cutthroat-rainbow trout hybrid generations. 136th Annual meeting of the American Fisheries Society, Lake Placid, NY 10-14 September 2006 (Oral by Ostberg)
- Haywood III, K. P., B. Miller, S. Zhang, J. J. Duda, C. Ostberg, and J. H. Graham. Effects of Genotype and Temperature on Growth, Morphology, and Developmental Instability of Hybrid Trout, *Oncorhynchus mykiss* and *O. clarki bouvieri*. Southeastern Ecology and Evolution Conference, University of Alabama, Tuscaloosa, Alabama, 3-5 March 2006 (Oral by Haywood)
- Graham, J. H. Genomic coadaptation and developmental instability in hybrid populations. Talk given at Western Fisheries Center, Seattle, WA 16 March 2006
- 2005 Graham, John H., Anthony J. Krzysik, Dave A. Kovacic, D. Carl Freeman, W. Russell Long, and Jonathan Nutter. Intermediate disturbance and ant communities in a forested ecosystem. Annual Meeting of the Ecological Society of America and The International Congress of Ecology, Montreal, Canada, 10 August (Oral by Graham)

- Krzysik, A.J., D.A. Kovacic, J.H. Graham, J.C. Zak, J.J. Duda, H.E. Balbach, M.P. Wallace, J.M. Emlen, D.C. Freeman, and C.C. Graham. Landscape disturbance and biodiversity patterns of vegetation and ants in a complex regional ecotone. Annual Meeting of the Ecological Society of America and The International Congress of Ecology, Montreal, Quebec, Canada, 11 August (Oral by Krzysik)
- Dolbeer, Jeff A. William Russell Long, John H. Graham, Anthony J. Krzysik, Jeffrey J. Duda, D. Carl Freeman, John M. Emlen, John C. Zak, Dave A. Kovacic, Catherine Chamberlin-Graham, and Harold Balbach. Community and population responses of Orthoptera and Blattaria to habitat disturbance. Southeastern Ecology and Evolution Conference, University of Georgia, Athens, Georgia, 11-13 March 2005 (Oral by Dolbeer)
- Nutter, Jonathan, W. Russell Long, John H. Graham, Anthony J. Krzysik, Dave A. Kovacic, Jeffrey J. Duda, D. Carl Freeman, John M. Emlen, John C. Zak, , Michael P. Wallace, Catherine Chamberlin-Graham, and Harold Balbach. Intermediate disturbance and ant communities in a forested ecosystem. Southeastern Ecology and Evolution Conference, University of Georgia, Athens, Georgia, 11-13 March 2005 (Oral by Nutter)
- 2004 Long, William Russell, Jonathan Nutter, John H. Graham, A. J. Krzysik, J. J. Duda, D. C. Freeman, J. M. Emlen, J. C. Zak, and D. A. Kovacic. Effects of habitat disturbance on ant communities in the southeastern Fall-Line Sandhills. Southeastern Ecology and Evolution Conference, Georgia Institute of Technology, Atlanta, Georgia, 5-7 March 2004 (Oral by Long)
- Godwin, Kaitlin, Nick Misulia, and John H. Graham. Symmetry breaking in *Drosophila melanogaster* exposed to ethanol. Southeastern Ecology and Evolution Conference, Georgia Institute of Technology, Atlanta, Georgia, 5-7 March 2004 (Poster)
- 2003 Graham, J. H., H. H. Hughie, S. Roth, K. Wrinn, A. J. Krzysik, J. J. Duda, D. C. Freeman, J. M. Emlen, J. Zak, D. Kovacic, H. Balbach, and C. Chamberlin-Graham. Effects of Habitat Disturbance on Diversity and Abundance of Ants in the Southeastern Fall-Line Sandhills. Annual Meeting of the Ecological Society of America, Savannah, GA. August 4-9, 2003 (Oral by Graham)
- Krzysik, A. J., D. Kovacic, M. Wallace, J. H. Graham, J. Zak, J.J. Duda, J. M. Emlen, D. C. Freeman and H. Balbach. Robust Multivariate Approaches for Developing Ecological Indicators to Classify Landscapes on a Military Disturbance Gradient. Annual Meeting of the Ecological Society of America, Savannah, GA. August 4-9, 2003 (Oral by AJ Krzysik)
- Kovacic, D.A., A.J. Krzysik, M.P. Wallace, J.J. Duda, D.C. Freeman, J.H. Graham, J.C. Zak, and H.E. Balbach. Soil mineralization potential as an indicator of ecological disturbance. Annual Meeting of the Ecological Society of America, Savannah, GA. August 4-9, 2003 (Oral by D Kovacic)
- 2002 Graham, J. H., H. H. Hughie, K. M. Wrinn, S. D. Roth, J. Kimball, C. Chamberlin-Graham, J. J. Duda, D. C. Freeman, J. M. Emlen, A. J. Krzysik, and H. E. Balbach. Response of Terrestrial Arthropod Communities to Physical Habitat Disturbance. Annual Meeting of the Ecological Society of America, Tucson, AZ. August 4-10, 2002 (Poster)
- Krzysik A. J., H. E. Balbach, J. M. Emlen, D. C. Freeman, J. H. Graham, D. A. Kovacic, and J. C. Zak. Development of Ecological Indicator Guilds for Land management. Annual Meeting of the Ecological Society of America, Tucson, AZ. August 4-10, 2002 (Presented by Krzysik)

- Wrinn, K. M., J. H. Graham, H. H. Hughie, D. C. Freeman, H. E. Balbach, J. J. Duda, J. M. Emlen, C. Chamberlin-Graham, A. J. Krzysik, and J. Kimball. Military-Training Activities on Spider Communities of the Fall-Line Sandhills at Fort Benning, Georgia. Annual Meeting of the American Society of Agronomy, Indianapolis, IN. November 10-14, 2002 (Poster presented by Wrinn)
- 2000 Fluctuating asymmetry and developmental noise during leaf expansion in the pumpkin *Cucurbita pepo*. Meeting of the Association of Southeastern Biologists, Chattanooga, TN. April 5-8, 2000 (Poster)
- 1997 A Theory of Developmental Stability (Graham, J. H., D. C. Freeman, J. M. Emlen. Society for the Study of Evolution, Annual Meeting, Boulder, Colorado (Oral Presentation)
- Plant response to environmental variation in the big sagebrush hybrid zone (Graham, J. H., D.C. Freeman, H. Wang, D. McArthur, B. Smith, S. Sanderson) Society for the Study of Evolution, Annual Meeting, Boulder, Colorado (Poster Presentation)
- 1995 Reciprocal transplant experiments in the Big Sagebrush Hybrid Zone, Universite Montpellier, France (December, all expenses paid)
- Keynote Address: Fitness and selection in the Big Sagebrush Hybrid Zone, University of North Carolina-Charlotte, Tri-Beta Conference (April)
- Developmental stability and ecotoxicology, Savannah River Ecology Labs, Aiken, South Carolina (March)
- 1994 Selection and fitness in the big sagebrush hybrid zone (Graham, J. H., J. M. Wang, E. D. McArthur, D. Byrd, and D. C. Freeman) Society for the Study of Evolution, Annual Meeting, Athens, Georgia (Oral Presentation)
- 1993 On the use of developmental instability in conservation biology (Graham, J. H., D. C. Freeman, and J. M. Emlen) Society for Conservation Biology, Annual Meeting, Tempe, Arizona (Oral Presentation)
- Measuring stress on *Fucus* using developmental stability (Tracy, M., D. C. Freeman, A. R. Hough, and J. H. Graham) Society for Conservation Biology, Annual Meeting, Tempe, Arizona (Poster)
- 1989 Society for the Study of Evolution, Annual Meeting, State College, Pennsylvania
- 1988 American Society of Ichthyologists and Herpetologists, Annual Meeting, Ann Arbor, Michigan.
- 1987 Population Biologists of New England, Annual Meeting, Queens College (CUNY), New York.
- 1987 American Society of Ichthyologists and Herpetologists, Annual Meeting, Albany, New York.
- 1985 American Society of Ichthyologists and Herpetologists, Annual Meeting, Knoxville, Tennessee.
- 1983 American Society of Zoologists, Annual Meeting, Philadelphia, Pennsylvania.
- 1980 New Jersey Academy of Science, Annual Meeting, New Brunswick, New Jersey (2 papers)
- 1977 American Society of Ichthyologists and Herpetologists, Annual Meeting, Gainesville, Florida.

SEMINARS

- 2007 Biology Department, Berry College, Mount Berry, Georgia
- 2006 Sigma Xi Seminar Genomic Co-adaptation and Developmental Instability in Hybrid Populations
- 2004 Biology Department, Berry College, Mount Berry, GA
- 2003 Biology Department, Berry College, Mount Berry, GA
- 2002 Biology Department. Berry College, Mount Berry, Georgia
- 1994 Biology Department. Berry College, Mt. Berry, Georgia.
- 1993 Biology Department. Berry College, Mt. Berry, Georgia.
- 1992 Biology Department. Berry College, Mt. Berry, Georgia.
- 1991 Biology Department. Berry College, Mt. Berry, Georgia.
- 1989 Biology Department. Berry College, Mt. Berry, Georgia.
- 1989 Division of Environmental Biology, Evolution, and Systematics Seminar Series. Wayne State University.
- 1988 Biometry Users Group, Wayne State University.
- Advanced Limnology Seminar, Wayne State University.
- General Ecology, Wayne State University.
- 1987 Center for Coastal and Environmental Studies, Rutgers University, New Brunswick, New Jersey.
- 1986 Ecology Program, Rutgers University, New Brunswick, New Jersey,
- 1977 Department of Biology, Rutgers University, Camden, New Jersey.

Ph.D. DEFENSE COMMITTEES

- 2007 Rohani Ambo Rappe, University of Newcastle, Australia (by mail)
- 2004 Claire C. Milton. University of Melbourne, Australia (by mail)
- 2003 Chantelle Sinclair. LaTrobe University, Victoria, Australia (by mail)
- 2002 Hema Indrasamy. University of Melbourne, Australia (by mail)
- 2000 Kris Freebairn. University of Melbourne, Australia (by mail)
- 1997 Poranee Uyatopas. Murdoch University, Australia (by mail)
- 1995 Paul Alibert. Universite Montpellier II, France (all expenses paid trip to France)

M.S. DEFENSE COMMITTEES

2000 Patricia Kosky. Columbus State University, Columbus, Georgia

REFERENCES

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