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**Charles J. Goodnight**  
**Curriculum Vitae**

**Address:** Department of Biology  
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Burlington, VT 05401

**Citizenship** United States

**Present Position:** Professor,  
Department of Biology,  
University of Vermont

**Education:** Ph.D., The Univ. of Chicago, 1983 (Biology, Advisor: Prof. M. J. Wade)  
M.S., The University of Chicago, 1979 (Biology)  
B.S., The University of Michigan, 1977 (Botany/Zoology with high honors  
in botany)

**Thesis Title:** "Genetical and Environmental Factors Influencing Evolution by Group  
and Individual Selection."

**Major Research Interests:** Quantitative genetics, evolution in structured and multiple  
species populations, group selection, population genetics, conservation genetics.

**Current Research:** Analytical models of the role of gene interaction in evolution in  
structured populations, experimental studies of population differentiation,  
inbreeding, and evolution using flour beetles, genus *Tribolium* .

**Professional Employment:**

Postdoctoral Research Associate, Department of Biological Sciences, Univ. of Illinois  
at Chicago, 1983-1986

Visiting Assistant Professor, Department of Biological Sciences, Univ. of Illinois at  
Chicago, 1986-1988

Assistant Professor, Department of Zoology, Univ. of Vermont, 1988-1994

Visiting Assistant Professor, Dept. of Mathematics, Univ. of Tennessee, 1993

Associate Professor, Department of Biology, Univ. of Vermont, 1994-1999

Professor, Department of Biology, Univ. of Vermont, 1999-Present

### **Teaching Experience:**

Environmental Biology 204 (undergraduate level), Univ. of Illinois at Chicago, 1986  
Quantitative Genetics, 492 (graduate seminar), Univ. of Illinois at Chicago, 1987  
General Biology: The Biology of Populations 102, Univ. of Illinois at Chicago, 1987, 1988  
General Biology: Principles of Biology, Univ. of Vermont, 1988 to present  
Graduate Colloquium: Evolution in Structured Populations, Univ. of Vermont, 1989  
Population Genetics, University of Vermont, 1989, to present.  
Graduate Colloquium: Levels of Selection, University of Vermont, 1991  
Environmental Biology, University of Vermont, 1991 - 1993  
Mathematical Evolutionary Theory, University of Tennessee, 1993  
Graduate Colloquium: Advanced topics in Population Genetics, 1994 to present  
Graduate Colloquium: The Design and Analysis of Ecological Experiments, 1994  
Conservation Biology (upper level undergraduate) 1995 to 2002.  
Graduate Colloquium: Biometrics 1997 to present  
Evolution 2002-present  
Scientific integrity 2010  
Evolution for non majors 2010 to 2015  
Biometry 1990 to present

### **Graduate Trainees:**

Leslie Pray, MS 1993, Ph.D 1996.  
Brittney Calsbeek Ph.D. 2010

### **Postdoctoral Associates:**

James Schwartz, NSF Postdoctoral Fellow, 1990-1994.

### **Service to Profession and University:**

Reviewer for numerous journals 1983-Present  
Reviewer and panel member for NIH, NSF 1983 - Present  
Associate Editor, Evolution 2003 - 2011  
Committees in the Department of Biology, including Executive council, curriculum committee, faculty search committees. 1989 - present  
EPSCoR Streams project 2009 - 2010  
EPSCoR Complex Systems initiative  
Faculty Mentor  
Leslie-Ann Dupigny-Giroux (Geology) 2000 - 2005  
Marta Cerony (Gund Institute) 2005 - 2010  
Adrian Del Maestro (Physics) 2011

CAS Curriculum Committee 2001-2005, Chair 2005-2008  
CAS representative to Honors college 2005-2008  
CAS other ad-hoc committees, including Dean and Chair review committees

Faculty Senate Executive Council 2010 – Present  
Faculty Senate Acting Vice President 2011.

**Major Grant Support:**

- NSF Grant #BSR-8306901, 1983. "Group Selection In Mixed Species Populations." \$36,667.00. (Written by David B. Mertz and Charles J. Goodnight Submitted by D. B. Mertz)(24 months).
- NSF Grant #BSR-8605672, 1986. "Genetic Differentiation of Populations in Mixed Species Association." \$64,893.00. (Charles J. Goodnight and David B. Mertz Co-P. I.) (12 months)
- NSF Grant #BSR-8746884, 1987. Research Opportunity Award(supplemental award to grant # BSR-8605672) \$10,000.00 (Charles J. Goodnight and David B. Mertz Co-P. I.) (24 months)
- NSF Grant #BSR-8906956 1989. "Collaborative Research: The effects of mating structure on phenotypic variation and its inheritance" \$66,104.00 (36 months)
- NSF Grant #DEB-9307694 1993. "Nonadditive genetic variance: The genetical consequences of population structure"\$94,000.00 (36 months)
- NSF Grant #DEB-9321689. 1993. "Dissertation Improvement Grant: An experimental test of genetic management for reduced inbreeding depression in small populations." \$10,000 (12 months)
- NSF Vt. EPSCoR Ecology and Evolution cluster. 1995-1997.
- NSF Grant #DEB-9615260 1996. "The quantitative genetics of metapopulations" \$115,000 (36 months)
- NSF DIGG 2009. (In support of B. Calsbeek). "Dissertation Research: Towards a Biologically Relevant Interpretation of Genetic Covariance Matrices: A Theoretical and Experimental Exploration of the Breeder's Equation". \$11,700
- NSF Vermont EPSCoR. 2010 (In support of B. Calsbeek). Graduate Research Assistantships "Predicting adaptive evolution using quantitative genetic and computer simulation techniques" \$27,000
- NIH R21 2010(in collaboration with Cedric Wesley) "Variation in Maternal and zygotic control of embryogenesis events in Drosophila \$413,875

**Recent contributed papers and posters:**

International Congress on Metapopulations, Helsinki Finland Fall 2002  
Society for the study of Evolution, 1990 – present  
FestSchrift honoring M. Wade, Boulder CO 2009

**Invited Seminars:**

University of Pittsburgh, Pittsburgh PA. October 2015  
State University of New York, Binghamton. September 2015

60<sup>th</sup> Brazilian Congress of Genetics, Guaruja Brazil, Fall 2015  
Multilevel selection and conservation. March 2015, University of Sao Carlos, Brazil  
ISHPSSB international meeting (two talks), Montpellier, France, Summer 2013  
58<sup>th</sup> Brazilian Congress of Genetics, Iguacu Brazil, Fall 2012  
Genetics of complex systems (Course) September 2012, University of Sao Carlos, Brazil  
University du Québec, Summer 2010  
Dartmouth College, February 2010  
Carlton University, Ottawa CA, February 2009.  
University of Manchester, Manchester England, Summer 2008  
Conference on epistasis, Ames IA, summer 2007  
NECSI International Meeting Nashua NH, Spring 2003, 2004  
International conference on Population Biology, Tsukuba Japan Fall 2003  
Tsukuba University, Tsukuba Japan (Fall 2003)  
NIH sponsored class on structured populations. Knoxville TN Fall 2003  
Long Term Selection conference, Champaign Illinois. Spring 2002  
University of Vermont, University Scholars Seminar, Fall 2002.  
International Botanical Congress, St. Louis, MO, August 1999  
International Conference on Complex Systems, Nashua, NH October 1998  
University of Vermont, Burlington VT October 1998  
International Symposium on Genetics and Exploitation of Heterosis in Crops, Mexico  
City, Mexico, August, 1997.  
Brown University, Providence, RI, March 1997  
U. of California, Santa Barbara January 1997  
University of Pittsburg, Pittsburg PA January 1997  
Harvard University, Cambridge Massachusetts. October 1996  
ASN Presidents Symposium, Providence Rhode Island. June 1996  
University of Missouri, St. Louis, Missouri. March 1995  
University of Illinois, Champaign/Urbana, Illinois. March 1995  
Washington University, St. Louis Missouri. November 1994.  
University of Vermont, Burlington Vermont, November, 1993  
European Conference on Evolutionary Biology, Montpellier France. August, 1993  
State University of New York, Stony Brook New York. April 1993  
University of Tennessee, Knoxville Tennessee. February 1993.  
Human Behavior Evolution Society Meetings, Hamilton Ontario, August. 1991.  
Washington University, St. Louis Missouri. February 1991.  
State University of New York, Stony Brook, New York. November, 1990.  
University of Vermont Burlington Vermont, March 1988.  
Indiana University of Pennsylvania, Indiana, Pennsylvania, January 1988.  
Midwest Population Biology Conference, Kellogg Biological Station (Michigan State  
University) Hickory Corners, Michigan, 1987  
Mountain Lake Biological Station, Virginia. July, 1987.  
Purdue University, West Lafayette Indiana, May, 1987.  
Indiana University, Bloomington, Indiana. February, 1987.

The University of California, Irvine, California. January, 1987.  
The University of California, Irvine. January, 1987.  
The Kennicott Club, The Chicago Academy of Sciences. June, 1986.  
The University of Chicago. May, 1986  
Northern Illinois University. March, 1986.  
Kellogg Biological Station (Michigan State University), November, 1985  
University of Illinois at Chicago, February, 1984

**Publications**  
**All listed publications are peer reviewed**

- Goodnight, C. J. (In Press). Gene interactions. In: Encyclopedia of Evolutionary biology R. Kliman (ed.) Elsevier.
- Goodnight, C. J. 2015. Multilevel selection theory and evidence: A critique of Gardner, 2015. *Journal of Evolutionary Biology* 28:1734-1746.
- Pruitt, J. N., C. J. Goodnight 2015. Pruitt and Goodnight Reply. *Nature* 524:E4-E5
- Goodnight, C. J. 2015. Long-term selection experiments: Epistasis and the response to selection. In: Epistasis: Methods and protocols, J. H. Moore, S. M. Williams (eds). Chapter 1, pp 1-18.
- Pruitt J. N. and C. J. Goodnight. 2014. Site-specific group selection drives locally adapted group compositions. *Nature* 514:359-362
- Mitteldorf, J, C. J. Goodnight, 2013. Post-Reproductive Life Span and Demographic Stability, *Biochemistry (Moscow)* 78:1013-1022.
- Goodnight, C. J. 2013. Chapter 2: Defining the Individual. pp. 37-54 In: From Groups to Individuals; Frédéric Bouchard and Philippe Huneman eds. MIT Press.
- Goodnight, C. J. 2013. On multilevel selection and kin selection: Contextual analysis meets direct fitness. *Evolution* 67:1539-1548
- Goodnight, C. J. 2012. Wright's shifting balance theory and factors affecting the probability of peak shifts. In: The adaptive landscape in evolutionary biology; Erik Svensson and Ryan Calsbeek eds. Oxford University Press. Chapter 6, pp. 74-86.
- Mitteldorf, J, C. J. Goodnight, 2012 Post-Reproductive Life Span and Demographic Stability, *Oikos* 121:1370-1378.
- Franks, Steven J., Gregory S. Wheeler, C. J. Goodnight 2012. Genetic variation and evolution of secondary compounds in native and introduced populations of the invasive plant *Melaleuca quinquenervia*. *Evolution* 66:1398-1412
- Higgins, L., J. Coddington, C. Goodnight and M. Kuntner. 2011. Testing ecological and developmental hypotheses of mean and variation in adult size in nephilid orb-weaving spiders. *Journal of Evolutionary Ecology* 25:1289-1306.
- Brandvain, Y., C. J. Goodnight and M. J. Wade 2011. Horizontal transmission rapidly erodes disequilibria between organelle and symbiont genomes. *genetics* 189: 397-404.
- Higgins, L. and C. Goodnight 2011. Developmental response to low diets by giant *Nephila clavipes* females. *Journal of Arachnology* 39:399-408.
- Goodnight, C. J. 2011 Evolution in Metacommunities. *Philosophical Transactions of the Royal Society B.* 366:1401-1409

- Wade M. J., D. S. Wilson, C. Goodnight, D. Taylor, Y. Bar-Yam, M.A.M. de Aguiar, B. Stacey, J. Werfel, G. A Hoelzer, E. D. Brodie III, P. Fields, F. Breden, T.A. Linksvayer, J.A. Fletcher, P. J. Richerson, J. Bever, J. D. Van Dyken and P. Zee. 2010. A different perspective on multilevel selection. *Nature* 463:E8-E9.
- Higgins, L, C. Goodnight. 2010 *Nephila clavipes* females have accelerating dietary requirements. *The Journal of Arachnology*. 38:150-152.
- Goodnight C. J. 2010. Adaptive landscapes and the concept of optimality. *Encyclopedia of Behavior*. Pages 24-29.
- Eppstein, M. J. Payne, C. Goodnight. 2009. Underdominance, Multiscale Interactions, and Self-Organizing Barriers to Gene Flow. *Journal of Artificial Evolution and Applications* 10.1155/2009/725049.
- Calsbeek, B, C. Goodnight. 2009. An empirical comparison of G matrix test statistics: finding biologically relevant change. *Evolution* 63:2627-2635.
- Goodnight, C., E. Rauch, H. Sayama, M. A. M. De Aguiar, M. Branger, and Y. Bar-Yam. 2008. Evolution in spatial Predator-Prey Models and the “Prudent Predatory”: The inadequacy of steady-state organism fitness and the concept of the individual and group selection. *Complexity* 13(5): 23-44
- Payne, J.L., Eppstein, M.J., & Goodnight, C.J. 2007. Sensitivity of Self-Organized Speciation to Long-Distance Dispersal. In *Proceedings of the IEEE Symposium on Artificial Life*, pp. 1-7, (winner of best student paper award).
- Eppstein, M. J., J. L. Payne, C. J. Goodnight 2006. Speciation by self-organizing barriers to gene flow in simulated populations with localized mating. *Workshop Proceedings for Genetic and Evolutionary Computation Conference (GECCO) 2006*.
- Wade, M. J., and C. J. Goodnight. 2006. Cyto-nuclear epistasis: two-locus random genetic drift in hermaphroditic and dioecious species. *Evolution* 60:643-659.
- Goodnight, C. J. 2006. News and Commentary: Peak shifts in large populations. *Heredity* 96:5-6
- Goodnight, C. J. 2005. Multilevel Selection: The Evolution of Cooperation in Non Kin Groups. *Population Ecology* 47:3-12
- Goodnight, C. J. 2004. Genetics and Evolution in Structured Populations. IN: *Evolutionary Genetics: Concepts and Case Studies*, C. Fox and J. Wolf Editors.
- Goodnight, C. J. 2004. Gene Interaction and Selection. In: K. Lamkey ed., *Long Term Selection: A Celebration Of 100 Years Of Selection For Oil And Protein In Maize*
- Goodnight, C. J. 2003. Metapopulation Quantitative Genetics. In: O. Gaggiotti ed. *The Biology of Metapopulations*.

- Michael J. Wade, R. G. Winther, A. F. Agrawal, C. J. Goodnight. 2001. Alternative definitions of epistasis: dependence and interaction. *Trends in Ecology & Evolution* 16: 498-504
- Goodnight, C. J. 2000, Heritability at the ecosystem level. *Proceedings of the National Academy of Sciences of the United States of America*, 97: 9365-9366
- Goodnight, C. J. 2000. Modeling gene interaction in structured populations. Pp. 213-231, in J. B. Wolf, E. D. Brodie, III, M. J. Wade, eds., *Epistasis and the Evolutionary Process*, Oxford University Press, Oxford.
- Goodnight, C. J., and M. J. Wade. 2000. The ongoing-synthesis: a reply to Coyne et al. (1999). *Evolution* 54:317-324.
- Goodnight, C. J. 2000 Quantitative Trait Loci and Gene Interaction: The Quantitative Genetics of Metapopulations. *Heredity* 84:587-598.
- Molofsky, J, S. L. Morrison, and C. J. Goodnight. 1999. Genetic and environmental controls on the establishment of the invasive grass, *Phalaris arundinacea*. *Biological Invasions* 1:181-188.
- Wade, M. J., C. J. Goodnight, and L. Stevens. 1999. Design and interpretation of experimental studies of interdemec selection: A reply to Getty. *American Naturalist* 154: 599-603.
- Goodnight, C. J. 1999. Epistasis and Heterosis. Pp. 59-68 In: James Coors and Shivaji Pandey eds., *The Genetics and Exploitation of Heterosis in Crops*. American Society of Agronomy, Inc/Crop Science Society of America, Inc. Madison, WI.
- Wade, M. J. and C. J. Goodnight, 1998. Genetics and adaptation in metapopulations: When nature does many small experiments. *Evolution*. 52:1537-1553
- Yan, G., L. Stevens, C. J. Goodnight and J. J. Schall 1997. Parasite mediated competition: The effect of parasites on the outcome and duration of competition and the evolution of virulence. *Ecology* 79:1093-1103.
- Tonsor, S. J. , and C. J. Goodnight. 1997. Evolutionary predictability in natural populations: Do mating system and nonadditive genetic variance interact to affect heritabilities in *Plantago lanceolata*? *Evolution* 51: 1773-1784
- Goodnight, C. J. and J. M. Schwartz. 1997. A bootstrap comparison of genetic covariance matrices. *Biometrics* 53:1026-1039.
- Goodnight, C. J. and L. Stevens. 1997. Experimental studies of group selection: What do they tell us about group selection in nature. *American Naturalist* 150:S59-S79.
- Pray L. A. and C. J. Goodnight 1997. The Effect of Inbreeding on phenotypic variance in the red flour beetle *Tribolium castaneum*. *Evolution* 51:308-313.
- Goodnight, C. J. and L. Stevens. 1996. How effective is interdemec selection? *TREE* 11:298-299.
- Pray, L. A., C. J. Goodnight, L. Stevens, G. Yan, and J. M. Schwartz. 1996. The effect of population size on effective population size. *Genetical Research* 68:151-156.



- Goodnight, C. J., D. M. Craig. 1996. The Effect of Coexistence on Competitive Outcome in *Tribolium castaneum* and *T. confusum*. *Evolution* 50:1241-1250
- Pray, L. A. and C. J. Goodnight, 1995. Genetic variability in inbreeding depression in the flour beetle, *T. castaneum*. *Evolution* 49:176-188.
- Goodnight, C. J. 1995. Epistasis and the increase in additive genetic variance: Implications for phase 1 of Wright's shifting balance process. *Evolution* 49: 502-511.
- Stevens, L., C. J. Goodnight and S. Kalisz. 1995. Multilevel selection in natural populations of jewelweed, *Impatiens capensis*. *American Naturalist* 145:513-526.
- Goodnight, C. J. 1995. Contextual Analysis and Group Selection. *Behavioral and Brain Sciences* 17:622
- Pray, L. A., J. M. Schwartz, C. J. Goodnight, and L. Stevens. 1994. Environmental Dependency of Inbreeding Depression: Implications for Biological Conservation. *Conservation Biology* 8:562-568
- Goodnight, C. J., J. M. Schwartz, and L. Stevens. 1992. Contextual analysis of models of group selection, soft selection, hard selection and the evolution of altruism. *American Naturalist*: 140:743-761.
- Goodnight, C. J. 1991. Intermixing ability in two species *Tribolium* communities. *American Naturalist* 138:342-354.
- Wade, M. J. and C. J. Goodnight. 1991. Wright's Shifting Balance Theory: An Experimental Study. *Science* 253: 1015-1018
- Goodnight, C. J. 1990. Experimental Studies of Community Evolution II. The ecological basis of the response to community selection. *Evolution* 44:1625-1636.
- Goodnight, C. J. 1990. Experimental Studies of Community Evolution I: The response to selection at the community level. *Evolution* 44:1614-1624.
- Goodnight, C. J. 1990. On the relativity of quantitative genetic variance components. *Behavioral and Brain Sciences*. 13:134-135.
- Goodnight, C. J. 1989. Population differentiation and the correlation among traits at the population level. *American Naturalist* 133:888-900.
- Goodnight, C. J. 1988. Epistatic genetic variance and the effect of founder events on the additive genetic variance. *Evolution* 42:441-454
- Goodnight, C. J. 1988. Population differentiation and the transmission of density effects between generations. *Evolution* 42:399-403
- Goodnight, C. J. 1987. On the effect of founder events on epistatic genetic variance. *Evolution* 41:80-91.

Goodnight, C. J. 1985. The influence of environmental variation on group and individual selection in a cress. *Evolution* 39:545-558.

Scheiner S. M. and C. J. Goodnight, 1984. The comparison of phenotypic plasticity and genetic variation in populations of the grass *Danthonia spicata*. *Evolution* 38:845-855.