

# On Being a Competitive Scientist in the 21<sup>st</sup> Century

Jerry O. Wolff, National Science Foundation

March 11-13, 2005

## Criteria for a Competitive Proposal

Likely high impact  
New and original ideas  
Succinct, focused project plan  
Knowledge of subject area or published, relevant work  
Experience in essential methodology  
Clarity concerning future direction  
Sound scientific rationale  
Realistic amount of work  
Sufficient detail  
Critical approach

## Essentials for Scientific Discovery

Theory  
Data  
Evidence  
Mechanism  
(Then you can draw inferences)

## Research Proposal Outline

Introduction  
    Problem (theoretical construct)  
    What is known  
    What is not known  
    Therefore my objective is. . . . .  
Model species or system  
Hypothesis (objective) I  
    Experimental design  
    Data analysis  
    Possible (expected) outcomes  
Hypothesis (objective) II (repeat)  
Timeline  
Broader impacts (Significance of results)  
Literature cited

## Challenge to Investigators

Know the natural history of your species  
Question the assumptions of methods and test the predictions of hypotheses  
Know the universe of your study, what inferences can you make; are you studying a species or a question  
Advance science, not “. . . more research is needed . . . . .“  
Question conventional wisdom – think outside the box  
Use quantitative (predictive [defensible]) terminology

**References for presentation “On Being a Competitive Scientist in the 21<sup>st</sup> Century”, Jerry O. Wolff, Midwest Ecology and Evolution Conference, Southern Illinois University, Carbondale, March 11-13, 2005**

- Caslin, T.M. and J.O. Wolff. 1999. Individual and demographic responses of the gray-tailed vole to vinclozolin. *Environ. Toxicol. Chem.* 18:1529-1533.
- Johnson, D.H. 1999. The insignificance of statistical significance testing. *J. Wildl. Manage* 63:763-772.
- Platt, J. R. 1964. Strong Inference. *Science* 146:347-353
- Wolff, J.O. 1980. The role of habitat patchiness in the population dynamics of snowshoe hares. *Ecol. Monogr.* 50:111-130.
- Wolff, J.O. 1982. Refugia, dispersal, predation, and geographic variation in snowshoe hare cycles. pp. 441-449, In, K. Myers and C.D. MacInnes (eds.). *Proc. World Lagomorph Conf.*, University of Guelph, Ontario.
- Wolff, J.O. 1986. Life history strategies of white-footed mice (*Peromyscus leucopus*). *Virginia J. Science* 37:208-220.
- Wolff, J.O. 1995. On the limitations of species-habitat association studies. *Northwest Science* 69:72-76.
- Wolff, J.O. 1996. Population fluctuations of mast-eating rodents are correlated with production of acorns. *J. Mammal.* 77:850-856.
- Wolff, J.O. 1997. Population regulation in mammals: An evolutionary perspective. *J. Anim. Ecol.* 66:1-13.
- Wolff, J.O. 1998. Breeding strategies, mate choice, and reproductive success in the American bison. *Special Publication, Costs of Reproduction, Oikos* 84:529-544.
- Wolff, J.O. 1999. Behavioral model systems. Pages 11-40. In: *Landscape ecology of small mammals*. G. Barrett and J. Peles, eds., Springer-Verlag Press, New York.
- Wolff, J.O. 2000. Reassessing research approaches in wildlife sciences. *The Wildlife Society Bull.* 28:744-750.**
- Wolff, J.O. 2003. Density-dependence and the socioecology of space use in rodents. Pp 124-130. In: "Rats, Mice and People: Rodent Biology and Management", eds. Singleton, G.R., L.A. Hinds, C.J. Krebs and D.M. Spratt, *ACIAR Monograph No. 96*, 564 pp.
- Wolff, J.O. 2003. An evolutionary and behavioral perspective on dispersal and colonization of mammals in fragmented landscapes. Pp 614-630 In: Zabel, C. J. and Anthony R. G. *Mammalian Community Dynamics: Management and Conservation in the Coniferous Forests of Western North America*. Cambridge University Press, Cambridge, UK.
- Wolff, J.O. 2003. Laboratory studies with rodents: Facts or artifacts? *Bioscience* 53:421-427.
- Wolff, J.O. 2004. Scent marking by voles in response to predation risk: a field-laboratory validation. *Behav. Ecol.*, (in press)
- Wolff, J.O. and A.S. Dunlap. 2002. Multi-male mating, probability of conception, and litter size in the prairie vole (*Microtus ochrogaster*). *Behav. Processes* 58:105-110.
- Wolff, J.O. and D.W. Macdonald. 2004. Promiscuous females defend their offspring. *Trends Ecol. & Evol.* 19:127-134.
- Wolff, J.O. and T. Van Horn. 2003. Vigilance and foraging behavior of American elk during the rut in predator and nonpredator habitats. *Can. J. Zool.* 81:266-271
- Wolff, J.O., Mech, S.G., A.S. Dunlap, and K.E. Hodges. 2002. Multi-male mating by paired and unpaired female prairie voles, *Microtus ochrogaster*. *Behaviour*. 139:1147-1160.
- Yoccoz, N. 1991. Use, overuse, and misuse of significance tests in evolutionary biology and ecology. *Bull. Ecol. Soc. Amer.* 72:106-111.