

Curriculum Vitae

Jonathan K. Waage

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Education:

Princeton University A.B. Biology, with honors, 1966
University of Michigan Ph.D. Zoology, 1971

Professional Appointments:

Instructor in Biology, Brown University - 7/72 - 6/73
Assistant Professor, Biology, Brown University - 7/73 - 6/79
Associate Professor, Biology, Brown University - 7/79 - 6/90
Professor, Biology, Brown University - 7/90 -
Executive Associate Dean of the College, Brown University - 1/02 -

Research Scholarship

Research Interests: (also see IV-A)

Evolutionary and ecological determinants of reproductive behavior in damselflies and dragonflies (Odonata). - Comparative and manipulative field studies of the adaptive patterns of pair-forming, territorial, mating and postcopulatory behavior.

Examination of the origins and consequences of asymmetric influence over reproduction by females. This includes a re-examination of sexual selection theory based on the perspective of female control over reproduction. - What are the resultant shifts in standard behavioral ecology paradigms?

Publications (complete):

- Waage, J. K. 1972. Longevity and mobility of adult *Calopteryx maculata*. Odonatologica. 1:155-162.
- Waage, J. K. 1973. Reproductive behaviour and its relation to territoriality in *Calopteryx maculata* (Beauvois) (Odonata; Calopterygidae). Behaviour. 47:240-256.
- Waage, J. K. 1975. Reproductive isolation and the potential for character displacement in the damselflies, *Calopteryx maculata* and *C. aequabilis* (Odonata: Calopterygidae). Syst. Zool. 24:24-36.
- Waage, J. K. 1978. Oviposition duration and egg deposition rates in *Calopteryx maculata*. Odonatologica. 7:77-88.

- Waage, J. K. 1979. Adaptive significance of postcopulatory guarding of mates and nonmates by male *Calopteryx maculata* (Odonata). Behav. Ecol. Sociobiol. 6:147-154.
- Waage, J. K. 1979. Dual function of the damselfly penis: sperm removal and transfer. Science. 203:916-918.
- Waage, J. K. 1979. Reproductive character displacement in *Calopteryx* (Odonata: Calopterygidae). Evolution. 33:104-116.
- Waage, J. K. 1980. Adult sex ratios and female reproductive potential in *Calopteryx* (Zygoptera: Calopterygidae). Odonatologica. 9:217-230.
- Waage, J. K. 1982. Sperm displacement by male *Lestes vigilax* Hagen (Zygoptera: Lestidae). Odonatologica. 11:201-209.
- Waage, J. K. 1983. Sexual selection, ESS theory and insect behavior: Some examples from damselflies (Odonata). Fla. Entomol. 66:19-31.
- Waage, J. K. 1984. Influence of oviposition behavior on female and male responses during courtship in *Calopteryx maculata* and *C. dimidiata* (Odonata: Calopterygidae). Anim. Behav. 32:400-404.
- Waage, J. K. 1984. Sperm competition and the evolution of odonate mating systems. In R.L. Smith (ed.) Sperm Competition and the Evolution of Animal Mating Systems. Academic Press, New York 8: 251-290.
- Waage, J. K & J. M. Bergelson. 1985. Differential use of pin and black cherry by the eastern tent caterpillar *Malacosoma americanum* (Fab.) (Lepidoptera: Lasiocampidae). Amer. Midl. Natur. 113:45-56.
- Waage, J. K. 1986. Evidence for widespread sperm displacement ability among Zygoptera (Odonata) and the means for predicting its existence. Biol. J. Linn. Soc. 28:285-300.
- Waage, J. K. 1986. Sperm displacement by two libellulid dragonflies with disparate copulation durations (Anisoptera). Odonatologica 15(4): 429-444.
- Oppenheimer, S. D. and J. K. Waage. 1987. Hand-pairing: a new technique for obtaining copulations within and between *Calopteryx* species (Zygoptera: Calopterygidae). Odonatologica 16:291-296.
- Waage, J. K. 1987. Choice and utilization of oviposition sites by female *Calopteryx maculata* (Odonata: Calopterygidae). I. Influence of site size and the presence of other females. Behav. Ecol. Sociobiol. 20:439-446.
- Waage, J. K. 1988. Confusion over residency and the escalation of damselfly territorial disputes. Anim. Behav. 36:586-595
- Waage, J. K. 1988. Reproductive behaviour of the damselfly *Calopteryx dimidiata* Burm. (Odonata: Calopterygidae). Odonatologica 17:365-378.
- Marden, J. H. & J. K. Waage. 1990. Escalated damselfly territorial contests are energetic wars of attrition. Anim. Behav. 39:954-959.
- Waage, J. K. 1997. Parental Investment -- Minding the kids or keeping control? In, P.A. Gowaty (ed.) Feminism and Evolutionary Biology: Boundaries, Intersections and Frontiers. Chapman & Hall, pp. 527-553
- Waage, J. K. & P. A. Gowaty. 1997. Myths of Genetic Determinism. In, P.A. Gowaty (ed.) Feminism and Evolutionary Biology: Boundaries, Intersections and Frontiers. Chapman & Hall, pp. 585-613.
- Fincke, O. M., J. K. Waage & W. D. Koenig. 1997 Natural and Sexual Selection Components of Odonate Mating Systems. In, J. Choe and B.J. Crespi (Eds.) The Evolution of Mating Systems in Insects and Arachnids. Cambridge University Press

Invited Book Reviews:

- 1984 - R. Thornhill & J. Alcock. 1983. The Evolution of Insect Mating Systems. Science 223:808-809.
- 1988 - R. Michod & B. Levin 1988. The Evolution of Sex. for Bioscience
- 1989 - T.H. Clutton-Brock 1988. Reproductive Success. for Bioscience

2000 – P. Corebet 1999 Dragonflies. For Quarterly Review of Biology

Editorial Service

1991 - Reviewed textbook for new edition - Alcock, J. *Animal Behavior*. Sinauer Press

1996 - Reviewed chapter on evolution of behavior -- D. Futuyma's revised evolution text - Sinauer Press

1997 - Reviewed chapters on sexual selection for new edition of Alcock. J *Animal Behavior* - Sinauer Press

1998 – Reviewed book proposal on Animal Behavior for Oxford U. Press

Invited Lectures (Since 1985):

1985: Dept. of Zoology, Arizona State University (Mar.); Dept. of Entomology, Rutgers University (Oct.); Dept. of Entomology, Univ. Massachusetts, Amherst (May)

1986: Paper and symposium organizer, N.E. Regional Animal Behavior Meetings, U. Vermont (Oct); Dept. of Psychology, Brown (two lunch talks - spring and fall).

1987: Dept. of Biology, Vassar College (Feb.); Dept. of Zoology, University of Oxford (Sept, 2 seminars); Dept. of Zoology, Liverpool University (Oct); Dept. of Zoology, Stockholm University (Oct, 2 seminars); Dept. of Zoology, Uppsala University (Oct, 2 seminars)

1988: Dept. of Anthropology, Harvard Univ. (Nov.); Dept. of Biology, U. Chicago (Dec.)

1989: Dept. of Entomology, Cornell University - Grace Griswold Seminar (Sept)

1990: Symposium on Sperm Competition - AAAS Meetings, New Orleans (Feb.); Department of Ecology and Evolutionary Biology, University of Minnesota (April); Department of Zoology, University of Rhode Island (March)

1991: Cambridge Entomological Society, Cambridge MA (Feb.); Department of Biology, University of Connecticut (March)

1992: Department of Biology, U. California at Santa Barbara (March)

1993: Department of Biology, U. California at San Diego (January); Department of Zoology, U. New Hampshire at Durham (October)

1994: Symposium on Feminism and Evolutionary Biology, University of Georgia (June); Max-Planck-Institut für Verhaltensphysiologie, Seewiesen (June); Department of Ecology and Evolution, Universität Bonn (July)

1995: Department of Biology, U. Georgia (February)

1996: Connecticut Entomological Society, New Haven CT (April)

1997: Sheffield University, Department of Zoology (March)

1997: Symposium on Sperm Competition, Animal Behavior Meetings, College Park, MD (June)

1998: Marine Biological Laboratories, Woods Hole (February)

1998: Department of Biology, Williams College (April)

1999: Department of Biology, U. New Hampshire -- cancelled due to father's death

Meetings Attended - since 1985 (paper read):**

1985: Population Biology of New England, Princeton; 8th International Congress of Odonatology, Paris **; International Ethological Congress, Toulouse **; Population Biology of New England, Yale **

1986: N.E. Regional Animal Behavior Meetings, U. Vermont **

1987: Animal Behavior Society Meetings, Williams College **

1988: Population Biology of New England, Connecticut College **

1989: 10th International Congress of Odonatology, Tennessee **; Animal Behavior Society Meetings, N. Kentucky Univ. **

1990: 3rd International Conference of Behavioural Ecology, Uppsala, Sweden **

1991: NECUSE meeting on Introductory Biology Courses - Williams College (May 1991)

1992: 4th International Conference of Behavioural Ecology, Princeton, NJ **
1994: ASAB Meeting, "Evolution of Signaling", Bern, Switzerland
1994: 5th International Conference of Behavioural Ecology, Nottingham, UK
1996: Animal Behavior Society Meetings, Northern Arizona University **
1997: Animal Behavior Society Meetings, University of Maryland**

Honors (since 1985): (also see IV-B)

1991: Invited to be American Editor for Behavioral Ecology & Sociobiology - declined
1993: Nominated to be American Editor for Animal Behavior - declined
1993: Invited to be American Co-Editor for Behavioral Ecology - deferred until later date
1997- : Member of editorial board of Pantala, Journal of Odonatology, The World Dragonfly Association

Service to the Profession - since 1985: (also see IV-F)

Active Member of: American Society of Naturalists (elected member), Society for the Study of Evolution, Animal Behaviour Society, and International Society for Behavioral Ecology.

Member of executive committee and editorial board of Societas Internationalis Odonatologica (1972-97)

Reviewer of manuscripts for: American Naturalist, American Scientist, Animal Behaviour, Behavioral Ecology, Behavioral Ecology and Sociobiology, Behaviour, Canadian J. Zoology, Ecology, Ethology, European Journal of Entomology, Evolution, Genetica, Journal of Insect Behavior, J. Theoretical Biology, Nature, Proc. Royal Soc London (Biology), and Science,

Reviewer of grant proposals for NSF. Population Biology and Psychobiology Panels
Member, external review committee for Biology - Hamilton College (Winter 1988)

NSF Post-doctoral Fellowship Review Panel (1988)

Grants-in-Aid of Research review committee, Sigma Xi (1988-93)

External examiner for tenure promotion, Department of Biology, Tufts Univ. (Fall, 1996)

Invited Ph. D. examiner, Department of Zoology, Sheffield University (1997)

Teaching Scholarship

Interests

Development of methods for promoting active learning and critical thinking. For example: students in my behavior course keep a journal containing weekly behavioral observations of campus animals, questions and thoughts about causes that underlie the behaviors they see, brainstorm about theories and concepts encountered in the course, and critiques of comments made in lectures and readings

Improving methods for conceptualizing basic biology concepts at the high school and college level. I have been involved with a number of interactions with high school and middle school teachers examining the way in which students are exposed to biology from elementary to college level.

How teaching must change to accommodate the tremendous increase in information available in science. I am exploring ways in which we can provide students with conceptual frameworks and "tool-kits" for navigating, evaluating and utilizing the information available for a given subject.

Honors (since 1985):

1994: Elizabeth H. Leduc Award for Excellence in Teaching, Brown University

- 1994: Invited faculty member for Summer School on the Evolution of Cooperation --
Max-Planck Institut für Verhaltensphysiologie, Seewiesen, Germany
1997- : Faculty Teaching Fellow, Sheridan Center
1999-00: Harriet W. Sheridan Award for Distinguished Contribution to Teaching and Learning

Undergraduate Teaching (since 1985):

- I design my courses around a particular view of science and science education:
- A. Rather than obtaining a solid background in facts and methodology before students start doing science on their own, I feel they should start doing science while accumulating the factual and procedural background. Facts and vocabulary are absolutely essential. However, they make more sense and are retained better if you start using them and discovering some of them yourself. Self-discovery is facilitated using course journals, homework assignments and essays.
 - B. Science (like all human endeavor) cannot be totally objective (free of bias). That bias comes from one's gender, culture, experience with biology, and personal value system. How we view the causal connections among things depends on our perspective. A good scientist must learn to recognize and deal with bias. Those who can look or think from several perspectives usually get further than those who are locked into just one perspective.
 - C. Biology is often taught as a set of disciplines (genetics, morphology, biochemistry, cell biology, etc.) that reflect "levels of organization" with chemicals at one end, cells and organisms sort of in the middle, and ecosystems at the other end. These are historical and conceptual artifacts, invented to deal with the complexity of biology. Life is a good deal less orderly. Learning to deal with that non-linearity and complexity is essential.
 - D. Science does not follow a simple "true/false" path to the answer. Rarely is "it is either A or B" true; especially in holistic fields like behavioral ecology and evolutionary biology. Usually the answer is: "Whether it is A, B, both, or neither depends on...". We live in an age where there is a vast amount of information to and the more we learn, the less obvious everything gets. I present science as a slowly evolving understanding of how little we know about the real world. I encourage an objective and skeptical (but not cynical) attitude toward the basic 'way of thinking' presented in my courses.

Courses

- Biomed 12 - Diversity of Life (1980-1986)
Biomed 19.3 – The Nature of Adaptation (2001 -)
Web page: http://www.brown.edu/Courses/BI0019_Waage/
Biomed 20 - Introduction to Biology (with D. Brautigam) (1994)
Biomed 20 - Introduction to Biology (with Coleman and Stein) (1999)
Biomed 20 - Introduction to Biology (two guest lectures) (2000)
Biomed 42 – Ecology (guest lecture 2001)
Biomed 45 - Animal Behavior - an evolutionary perspective (1984 -)
Web page: http://www.brown.edu/Courses/Bio_45/
Biomed 140 - Behavioral Ecology Seminar (1981 -)
Web page: <http://www.brown.edu/Courses/BI0140-Waage/index.html>
Biomed 45s - Animal Behavior - Brown University Summer Session (1992)
GISP -Why Women Drop out of Science in Early College Years - Faculty sponsor (1993)
GISP - Gender Perspectives in Science - Faculty Co-sponsor (1996)
Biomed 293 - Graduate Seminar EEB (1993)
Biomed 294 - Graduate Seminar EEB (with S. Swartz) (1993)
Biomed 294 Graduate Seminar EEB (with S. Gatesy) (1999)

Independent studies (last 4 years)

1997-98

Johanna Kolodziejski (honors thesis advisor, RWP Zoo)
Jill Anderson (second reader, Biology honors thesis)
Alexander MacLeod (second reader, Biology honors thesis, RWP Zoo)
Peter Tsai (independent study both semesters)
Anne Woomer (independent study – Education Department)
Rachel Zoffness (Science Writing IS – w/ Marge Thompson)

1998-99

Tania Tracy (Summer UTRA project, RWP Zoo, Honors)
Amanda Rhee - Honors
Heather Sullivan – 2nd reader, Honors

1999-00

Corissa Binns – 2 semesters
Nina Carter – Fall semester
Charlotte Lapsansky – (UTRA)

2000-01

Sarah Kingan – science writing
Sarah Kingan (Utra co-sponsor w/ M. Tatar)
Katy Greenwald (Hughes/Utra)

Graduate and Post Doctoral Students (since 1990):

Thesis advisor for:

Suzzane Oppenheimer - Ph.D., 1990 - Function of courtship in odonates
Martha Dunham - Ph.D., 1993 - Determinants of territory tenure in dragonflies
Diane Angell - Ph.D., 1993 - Determinants of variations in red squirrel caching patterns
Katja Schultz - visiting student from Germany - Dungfly mating systems
Collin Purrington Ph.D., 1993 - member of committee
Patricia Wilhelm Ph.D., 1993 - member of committee
Jeffery Parrish - Ph.D., 1996 - member of committee
Kathleen Earls – Ph.D., 1999 – member of committee
Edgar Leighton – Ph.D., - member of committee

Post-doctoral students:

James Marden - 1988 - NSF Post-doctoral Fellowship - Dynamics of damselfly territorial disputes
Nico Michiels - 1990 - NATO and Belgium Science Fund - Odonate sperm competition
Heike Hadrys - 1990-91 - Yale University - External advisor - Molecular genetics of odonates

External Ph.D. Committee Member or Reader for:

Susan Allen, Department of Psychology, Brown University (Spring 1991)
Seth Boatright-Horowitz, Dept. Psychology, Brown University (external member, 1992-)
Mark Schofield Dept. Psychology, Brown University (external member Masters Thesis - 1997)
Heather Mason-jones, Biology Department, Tufts University (external reader for Ph.D. Thesis 1999)
Thomas Artis, Biology Department, Clark University (external advisor on Ph.D. project – 1997-2000)
Dena Hyman, Department of Biology, University of Miami (external member of Thesis Committee) 1999 –

Undergraduate Advising - since 1985

Freshman Advisor (1985-86)
Biomed A.B. Concentration Advisor (1986-89, 1990-93, 1996 -)
Randall Counselor (1989-93, 1995-97)
Sophomore Advisor for University (1990-91)
Faculty Liaison, Brown Men's Soccer Team (1989 -96)
Faculty Liaison, Brown Women's Soccer Team (1992 -97)
A Day on College Hill – Represented Biomed (April 2000)

Teaching Grant Support (since 1985)

1993: Salomon Grant - Brown Univ. - for purchase of films for animal behavior course
1994-95: Brown University Teaching Award -- research stipend
1998: Wriston Grant Proposal, Brown University – for new course on the Nature of Adaptation (Biomed 19.3)

Presentations on Teaching - since 1985:

1985, 1996 & 1989: Lecturer in Brown/Rhode Island Biology Seminar Series for high school teachers
1990: Organizer and lecturer for Brown/Rhode Island Biology Seminar Series for high school teachers 1990
1991: Invited lecture to Dana Hall School, Wellesley, MA (Jan. 1991)
1993: Speaker for WISE Panel on Women in Science, Parent's Weekend (October)
1993: Speaker for Center for Advancement of College Teaching meeting (October)
1994: Discussant at Pembroke Center Roundtable, "Marks of Gender and the Crisis of Legal forms", (March)
1997: Participant in Roundtable on: Gender Equity in the Science Classroom, WISE
1997: Workshop on the use of journals in teaching, Biology Retreat (May)
1997: Session for Conference on Reflective Teaching in Higher Education, Sheridan Center (October)
2000: Presenter and Participant in Evolution Symposium for Teachers – Brown University (May)
2001: Participant in "Talking Across the Borders: Curriculum Seminars for K-18 Faculty" (sponsored by the Education Department)

University Education Oriented Committees - since 1985:

Modes of Analysis Course Screening Committee (1987)
Member, Advisory Committee on Summer Studies (1988-1993)
Environmental Sciences Committee for establishing the E.S. Sc.B. degree - chair (1991)
Member, College Curriculum committee (1990-1993, 1997- 99, 2000, 2002-)
Member of CCC screening committee (1997-99)
Vice Chair of CCC (1999)
Biomed Undergraduate Curriculum Committee (1979-86);

Other Teaching Related Service to the University - since 1992:

1997- : Faculty Teaching Fellow, Sheridan Center -- Individual Teaching Consultations for and advising to the Center
1998- : Faculty Teaching Liaison, Dept. Ecol. & Evol. Biol. , Sheridan Center
1999- : Sheridan Center Advisory Board
2000: Dean of the College search committee
2000: Interviewed candidate for Associate Dean of College position (May)

Other Service to the University:

University Committees - since 1985: (also see IV-H)

Environmental Studies Center, Executive Committee (1978-1993)
Promotions Committee, Biology and Medicine (1990- 1994)
Special Promotions Committee, Psychology – chair (1997-99)

Departmental Committees - since 1985:

Chair, Biomed Search Committee, Temporary Evolutionary Biology position (1988);
Temporary Evolutionary Biology position (1990)
Biomed Search Committee Member; Theoretical Ecologist (1986-87); Evolutionary
Genetics (1990); Senior Evolutionary Morphologist (1988-89)
Acting Chair, Sections of Population Biology and Genetics and Morphology (1988-89)

Other Service to the University - since 1992:

1992: Speaker for Parent's Weekend (October)

Service to the Community - since 1985:

Leader of lecture/field trips for RI Audubon Society (1975-86)
Member, Board of Directors, RI Audubon Society (1988-94)
Lecture on Animal Behavior Wheeler School (Sept. 1991)
Judge for Wheeler School Science Fair (February 1993)
Member, Board of Directors, Caratunck Wildlife Refuge, Seekonk, MA (1993 -1996)
Faculty Lecturer, Brown Alumni Trip to Costa Rica (March 1997)
Member of Conservation Commission, Rehoboth, MA (1998 -99)