Curriculum Vitae

Sharon Miriam Swartz

Associate Professor, Ecology and Evolutionary Biology
Adjunct Associate Professor, Engineering

Education:

1977-1981 B.A. Oberlin College. Biology and Sociology/Anthropology, with High Honors

1982-1985 M.S. The University of Chicago. Evolutionary Biology

1985-1988 Ph.D. The University of Chicago. Evolutionary Biology
Dissertation: The Biomechanics and Structural Design of the Forelimb of Brachiating Primates

Professional Appointments:

1996-present Associate Professor, Brown University, Department of Ecology and Evolutionary Biology
Adjunct Associate Professor, Brown University, Division of Engineering

1990-1996 Assistant Professor, Brown University, Department of Ecology and Evolutionary Biology
Adjunct Assistant Professor, Brown University, Division of Engineering

1987-1990 Assistant Professor, Northwestern University Medical School, Department of Cell Biology & Anatomy, and Northwestern University College of Arts and Sciences, Department of Anthropology

Completed Publications
Chapters in Books:

Swartz, H. M. and S. M. Swartz. 1983 Biochemical and Biophysical Applications of Electron Spin Resonance. in *Methods of Biochemical Analysis*, volume 29, D. Glick, ed. pp. 207-323. John Wiley and Sons, Inc., New York.

Swartz, S. M. and A. A. Biewener. 1992. *Shape and scaling*. in Biomechanics: A Practical Approach. Vol. 2. Structures. (A. A. Biewener, ed.). pp. 20-43. Oxford University Press.

Swartz, S. M. 1993. The biomechanics of primate limbs. in *Postcranial Adaptation in Nonhuman Primates* (D. L. Gebo, ed.). pp. 5-42. Northern Illinois University Press.

Swartz. S. M. 1998. Skin and bones: the mechanical properties of bat wing tissues. in *Bats: Phylogeny, Morphology, Echolocation, and Conservation Biology*. (T. H. Kunz and P. A. Racey, eds.) Smithsonian Institution Press.

Swartz, S. M., P. Freeman, and E. Stockwell. In press. Ecomorphology. in *Bat Ecology*. (T. H. Kunz, ed.) The University of Chicago Press.

Swartz, S. M., Bishop, K. L., and Ismael-Aguirre, M. F.* In press. Bat flight aerodynamics: new insights from three-dimensional kinematic analysis. In *Functional and Evolutionary Ecology of Bats* (Z. Akbar, G. F. McCracken, and T. H. Kunz, eds). Oxford University Press.

Refereed Journal Articles:
*undergraduate co-authors

Biewener, A. A., S. M. Swartz and J. E. A. Bertram. 1986. Bone modeling during growth: dynamic strain equilibrium in the chick tibia. *Calcified Tissue International* 39:390-395.

Swartz, S. M. 1987. Skeletal biomechanics and suspensory locomotion: preliminary results of *in vivo* bone strain analysis of brachiating gibbons. *Proceedings of the American Society of Biomechanics* 3:151-153.

Swartz, S. M., A. A. Biewener, and J. E. A. Bertram. 1989. Telemetered *in vivo* strain analysis of locomotor mechanics of brachiating gibbons. *Nature* 342:270-272.

Swartz, S. M. 1989. The functional morphology of weight bearing: limb joint surface area allometry in anthropoid primates. *Journal of Zoology, London* 218:441-460.

Swartz, S. M. 1990. Curvature of the limb bones of anthropoid primates: overall allometric patterns and specializations in suspensory species. *American Journal of Physical Anthropology* 83(4):477-498.

Swartz, S. M. 1990. Pendular mechanics and the kinematics and energetics of brachiating locomotion. *International Journal of Primatology* 10(5):387-418.

Swartz, S. M. 1991. Strain analysis as a tool for functional morphology. *American Zoologist 31*(4):655-669.

Bertram, J. E. A. and S. M. Swartz. 1991. The "Law of bone transformation": A case of crying Wolff? *Biological Reviews of the Cambridge Philosophical Society* 22(3):245-273.

Anton, S. C*., C. R. Jaslow and S. M. Swartz. 1992. Sutural complexity in artificially deformed human (*Homo sapiens*) crania. *Journal of Morphology* 214:321-322.

Swartz, S. M., M. B. Bennett, and D. R. Carrier. 1992. Wing bone stresses in free flying bats and the evolution of skeletal design for flight. *Nature* 359:726-729.

Halgrimmsson, B.* and S. M. Swartz. 1995. Morphological adaptation in the hylobatid ulna: cross-sectional geometry and skeletal loading. *Journal of Morphology* 224:111-123.

Swartz, S. M., M. D. Groves*, H. D. Kim* and W. R. Walsh. 1996. Mechanical properties of bat wing membrane skin: aerodynamic and mechanical functions. *Journal of Zoology, London,* 239:357-378.

Papadimitriou, H. M. *, S. M. Swartz, and T. H. Kunz. 1996. Ontogenetic and anatomic variation in mineralization of the wing skeleton of the Mexican free-tailed bat, *Tadarida brasiliensis*. *Journal of Zoology, London,* 240:411-426.

Swartz, S. M. 1997. Allometric patterning in the limb skeleton of bats: Implications for the mechanics and energetics of powered flight. *Journal of Morphology*, 234:277-294.

Swartz, S. M., A. Parker*, and C. Huo*. 1997. Theoretical and empirical scaling patterns and topological homology in bone trabeculae. *Journal of Experimental Biology*, 201:573-590.

Watts, P., E. J. Mitchell*, and S. M. Swartz. 2001. A computational model for estimating mechanics of horizontal flapping flight in bats. Model description and comparison with experimental results. Journal of Experimental Biology. 204: 2873-2898.

Book Reviews:

A Theory of Human and Primate Evolution, by Colin P. Groves. Clarendon Press, Oxford, 1989. *International Journal of Primatology* 1990, 11(6):607-609.

Taking Wing: Archaeopteryx and the Evolution of Bird Flight, by Pat Shipman. Simon and Schuster, New York, 1998. *Science* 281(5375):355-356.

Prime Mover; a Natural History of Muscle by Steven Vogel. Norton, New York, 2002. *Science* 295:1650-1651.

Abstracts: (2002 only)

Swartz S. M., K. L. Bishop, M. F. I. Aguirre, E. S. Stockwell, J. A. Skene. Large-scale deformations in the wing bones of flying bats. Society for Integrative and Comparative Biology.

Bishop K. L., Swartz S. M., E. S. Stockwell, J. A. Skene, M. F. I. Aguirre. Three dimensional complexity of bat wing movements. Society for Integrative and Comparative Biology.

Swartz, S. M., K. L. Bishop, K. S. Breuer, D. H. Laidlaw, & G. E. Karniadakis. Skin and Bones: Bat wings and their role in flight performance. International Congress on Comparative Physiology and Biochemistry.

R. J. Bigge, T. Fukuda, C. Jenny, N. Rangarajan, and S. Swartz A Biomechanical model of abusive infant head trauma. San Diego Conference on Child and Family Maltreatment.

Invited Lectures (2002 only):

Harvard University Concord Field Station Structure and Function Colloquium

Symposium for Undergraduates in Mathematical Sciences, Brown University

Biomedical Engineering Seminar Series, Brown University

Women in Science and Engineering, Brown University

Writing Fellows Colloquium, Brown University

Guest Speaker, Interdisciplinary Scientific Visualization (CS237), Brown University & RISD

Work in Review:

Mitchell, E. J. * and S. M. Swartz. In review. The influence of trabecular tissue on whole-bone stress distribution: a case study in a small mammal. *Journal of Experimental Biology*.

Swartz, S. M. and S. M. Gilbert. In review. The structural geometry of bat wing bones and the risk of buckling failure. *Journal of Theoretical Biology*.

Earls, K. D., C. Gahan*, and S. M. Swartz. In review. Structural design of bird bones: does the distribution of cancellous tissue in the long bones of diverse taxa reflect mechanical loading? *Journal of Experimental Biology.*

Swartz, S. M., I. Fischer*, J. Skene*, and M. Huber*. In review. Computational modeling of the mechanics and energetics of load-carrying in large bats. *Journal of Experimental Biology*.

Work in Progress:

Swartz, S. M. and K. L. Bishop. Three-dimensional kinematics of bat flight: unexpected complexity in wing geometries. In preparation for *Journal of Experimental Biology.*

Swartz, S. M., K. S. Breuer, & G. E. Karniadakis, D. H. Laidlaw. Computational fluid dynamic modeling of airflow around flapping bat wings. In preparation for *Philosophical Transactions of the Royal Society of London.*

Service:
To the University:

Acting Dean for Biology Undergraduate Affairs, Spring Semester, 2002

Medical School Committee on Academic Standing

Institutional Animal Care and Use Committee

University Committee on the Status of Women

Taskforce on Teaching and Doctoral Education, Office of the Dean of the Graduate School

Committee on Resumed Undergraduate Education

Selected as Brown University's representative for Project Kaleidoscope (PKAL) Faculty for the 21st Century, 2001-2002

Biological Sciences Representative to Brown University's Undergraduate Research and Teaching Assistantships Program; evaluated approximately 300 collaborative student/faculty proposals

Selection Committee for Howard Hughes Foundation Research Assistantships

Women in Science and Engineering (WiSE) Steering Committee

Women in Science and Engineering Affinity Group Leader

Selection Committee, Biology Undergraduate Graduation Prizes

Faculty Mentor, Biomedical Engineering Concentration

Animal Care Facilities Veterinarian Search Committee

Wayland Collegium Executive Board

To the Profession:

Journal Editorships (Associate):
Journal of Morphology
Journal of Experimental Biology

Journals Refereed:
Journal of Experimental Biology
Journal of Morphology
Journal of Zoology
Journal of Biomechanics
Evolution and Development
Acta Anatomica
Journal of Mammalogy

Ad hoc reviewer for NSF Integrative Animal Biology, Ecological and Evolutionary Physiology, Systematics, and Biological Anthropology Panels

Outside Examiner (Opponent) for doctoral defense of Anna Zeffer, Department of Zoomorphology, University of Göteborg, Sweden

To the Community:

Created and carried out biology 'lesson/experiences' for preschool and kindergarten students at Brown/Fox Point Early Childhood Education Center

Sponsored and advised undergraduates working in educational outreach programs through the NASA/RI Space Grant Program

Science Fair Judge, North Kingstown Public Schools

Academic Honors, Fellowships, Honorary Societies:

1981 Phi Beta Kappa

1982-1985 Searle Graduate Fellowship, The University of Chicago

1985-1986 Harper Memorial Doctoral Fellowship, The University of Chicago

1992 Mary Putnam-Jacobi Award for the Outstanding Woman Medical Faculty Member, Brown Women in Medicine

1995 Nominee, American Medical Women's Association Gender Equity Award

1995-1999 Marshall, Brown University School of Medicine Commencement Exercises

1999 Winner, American Medical Women's Association Gender Equity Award

1999 Hooder, Brown University School of Medicine

2000 Dean's Excellence in Teaching Award, Brown Medical School

Teaching

Courses taught:
2000-2001 Fall: BioMed 181, Human Morphology; Double Credit Course, 68 students (w/ T. Goslow and S. Gatesy)
Spring: Ecology and Evolutionary Biology Graduate Seminar, The History of Evolutionary Theory: The New Synthesis (w/D. Morse), 15 students
2001-2002 Spring: BioMed 194-8 (now BioMed 40); 23 students
2002-2003 Fall: BioMed 40; 38 students

Undergraduate research sponsorship:
* Honors thesis completed or expected
** research presented at national or international meeting
*** research presented at local or regional meeting
# research published or soon to be published
italics: women or underrepresented minorities

2000-2001 *Katy Greenwald**
Maryem Fama Ismael-Aguirre, **, #*
2001-2002 Yoni Gall*
Arun Gyuris
Maryem Fama Ismael-Aguirre, **, #*
Sharon Sonenblum (Biomedical Engineerin Honors)

Rachel Weinstein (Computer Science Honors),** ****
Akita Evans (Brown-Tougaloo Exchange Program)
Paul Alleyne (Brown-Tougaloo Exchange Program)
2002-2003 *Laura Schonmuller*
Elliot Lieberman
Marti Kamlet
Ariel Thompson#
Charles Goldenberg*
*Winnie Szeto**
Danial VanMeter*
*Dania Villarnovo**
Noa Kay (Engineering Honors; NASA Space Grant Fellow)
Diana Comarato (second reader)*

Graduate Students Supervised:
Primary Advisees:
Kristin Bishop, Ph.D. expected 2005
José Iriarte-Diaz, Ph.D. expected 2007

Additional Ph.D. Thesis Committee Advisees:
Kevin Middleton, Ph.D. 2002
David Baier, Ph.D. expected 2004
Eddy Hueso (Computer Science), Master's expected 2003
Jasmine Foo (Applied Mathematics), Ph.D. expected 2006

Undergraduate advisees:
Sc.B./A.B. Biology Concentration Advisor: 8 students
Human Biology Concentration Advisor: 19 students
PLME Faculty Advisor: 8 students
Sophomore Advisor: 6 students