

**Curriculum Vitae
Timothy Edward Higham**

Assistant Professor
Department of Biological Sciences
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CURRENT POSITION:

2008 to present: Assistant professor, Clemson University.

POST-DOCTORAL:

2006 to 2008: Harvard University. Advisor: Andrew Biewener

EDUCATION:

2006: Ph.D. University of California, Davis. Advisor: Peter C. Wainwright
2003: M.S. University of Cincinnati. Advisor: Bruce C. Jayne
2000: B.S. University of Calgary

PUBLICATIONS:

- 20) Higham, T.E. and A.P. Russell. 2010. Flip, flop and fly: modulated motor control and highly variable movement patterns of autotomized gecko tails. *Biology Letters*. In press. doi:10.1098/rsbl.2009.0577
- 19) Russell, A.P. and T.E. Higham. 2009. A new angle on clinging in geckos: Incline, not surface structure, triggers the deployment of adhesive system. *Proceedings of the Royal Society B*. 276, 3705-3709.
- 18) Higham, T.E. and A.A. Biewener. 2009. Fatigue alters *in vivo* function within and between limb muscles during locomotion. *Proceedings of the Royal Society B*. 276, 1193-1197.
- 17) Wainwright, P.C., R.S. Mehta and T.E. Higham. 2008. Stereotypy, flexibility and coordination: key concepts in behavioral functional morphology. *Journal of Experimental Biology*. 211(22), 3523-3528.
- 16) Higham, T.E. and F.E. Nelson. 2008. The integration of lateral gastrocnemius muscle function and kinematics in running turkeys. *Zoology* 111(6), 483-493.
- 15) Higham, T.E. and A.A. Biewener. 2008. Integration within and between muscles during terrestrial locomotion: effects of incline and speed. *Journal of Experimental Biology* 211(14), 2303-2316.

- 14) **Higham, T.E.**, A.A. Biewener and J.M. Wakeling. 2008. Functional diversification within and between muscle synergists during locomotion. *Biology Letters* 4(1), 41-44.
- 13) Day, S. W., **T. E. Higham** and P. C. Wainwright. 2007. Time resolved measurements of the flow generated by suction feeding fish. *Experiments in Fluids*. 43(5), 713-724.
- 12) Wainwright, P.C., A.M. Carroll, D.C. Collar, S.W. Day, **T.E. Higham** and R.A. Holzman. 2007. Suction feeding mechanics, performance and diversity in fishes. *Integrative and Comparative Biology* 47(1), 96-106.
- 11) **Higham, T.E.** 2007. The integration of locomotion and prey capture in vertebrates: evolution of morphology, behavior and performance. *Integrative and Comparative Biology* 47(1), 82-95
- 10) **Higham, T.E.**, C.D. Hulsey, O. Rican and A.M. Carroll. 2007. Feeding with speed: prey capture evolution in cichlids. *Journal of Evolutionary Biology* 20(1), 70-78.
- 9) **Higham, T.E.** 2007. Feeding, fins and braking maneuvers: locomotion during prey capture in centrarchid fishes. *Journal of Experimental Biology* 210(1), 107-117.
- 8) **Higham, T.E.**, S.W. Day, and P.C. Wainwright. 2006. The pressures of suction feeding: the relation between buccal pressure and induced fluid speed in centrarchid fishes. *Journal of Experimental Biology* 209(17), 3281-3287.
- 7) **Higham, T.E.**, S.W. Day, and P.C. Wainwright. 2006. Multidimensional analysis of suction feeding performance in fishes: fluid speed, acceleration, strike accuracy and the ingested volume of water. *Journal of Experimental Biology* 209(14), 2713-2725.
- 6) **Higham, T.E.**, B. Malas, B.C. Jayne and G.V. Lauder. 2005. Constraints on starting and stopping: behavior compensates for reduced pectoral fin area during braking of the bluegill sunfish *Lepomis macrochirus*. *Journal of Experimental Biology* 208(24), 4735-4746.
- 5) Day, S.W., **T.E. Higham**, A.Y. Cheer, and P.C. Wainwright. 2005. Spatial and temporal patterns of water flow generated by suction feeding bluegill sunfish *Lepomis macrochirus* resolved by Particle Image Velocimetry. *Journal of Experimental Biology* 208(14), 2661-2671. Also see cover.
- 4) **Higham, T.E.**, S.W. Day and P.C. Wainwright. 2005. Sucking while swimming: evaluating the effects of ram speed on suction generation in bluegill sunfish *Lepomis macrochirus* using digital particle image velocimetry. *Journal of Experimental Biology* 208(14), 2653-2660. Also see cover.
- 3) **Higham, T.E.**, and B.C. Jayne. 2004. *In vivo* muscle activity in the hindlimb of the arboreal lizard, *Chamaeleo calytratus*: general patterns and the effects of incline. *Journal of Experimental Biology* 207(2), 249-261.

- 2) **Higham, T.E.**, and B.C. Jayne. 2004. Locomotion of lizards on inclines and perches: hindlimb kinematics of an arboreal specialist and a terrestrial generalist. *Journal of Experimental Biology* 207(2), 233-248.
- 1) **Higham, T.E.**, M.S. Davenport, and B.C. Jayne. 2001. Maneuvering in an arboreal habitat: the effects of turning angle on the locomotion of three sympatric ecomorphs of *Anolis* lizards. *Journal of Experimental Biology* 204(23), 4141-4155.

ABSTRACTS AND PRESENTATIONS:

- 19) Eng, C.M., A.A. Biewener and **T. E. Higham**. 2009. Muscle fiber length operating ranges reflect disparate functions between muscles. Oral presentation at the annual meeting of the Society for Integrative and Comparative Biology, Boston, Massachusetts, USA.
- 18) **Higham, T.E.** and A.A. Biewener. 2009. Fatigue fiddles with fowl function: Altered *in vivo* muscle function during locomotion. Oral presentation at the annual meeting of the Society for Integrative and Comparative Biology, Boston, Massachusetts, USA.
- 17) **Higham, T.E.** and A.A. Biewener. 2008. Fatigue alters *in vivo* function within and between limb muscles during running. Poster presentation at the American Physiological Society meeting entitled "The Integrative Biology of Exercise - V" in Hilton Head, South Carolina, USA.
- 16) **Higham, T.E.**, A.A. Biewener and J.M. Wakeling. 2008. Functional diversification within and between muscle synergists during locomotion. Presentation at the annual meeting of the Society for Integrative and Comparative Biology. San Antonio, Texas, USA.
- 15) **Higham, T.E.** and A.A. Biewener. 2007. Functional heterogeneity within and between muscles during running in guinea fowl. Oral presentation at the annual meeting of the American Society of Biomechanics. Stanford University, Palo Alto, California, USA.
- 14) **Higham, T.E.** and A.A. Biewener. 2007. Functional heterogeneity within and between muscles during locomotion. *Bulletin of the Canadian Society of Zoologists*. Oral presentation at the annual meeting of the Canadian Society of Zoologists, Montreal, Quebec, Canada.
- 13) **Higham, T.E.** 2007. Swimming, running and flying: the evolution of locomotion during prey capture. *Integrative and Comparative Biology*. Oral presentation (symposium) at the annual meeting of the Society for Integrative and Comparative Biology, Phoenix, Arizona, USA.
- 12) Holzman, R., S.W. Day, **Higham, T.E.** and P.C. Wainwright. 2007. It's all in the timing: forces exerted on prey during suction feeding in Bluegill. *Integrative and Comparative Biology*.

- 11) **Higham, T.E.** 2006. Multidimensional analysis of suction feeding performance: fluid speed, acceleration, strike accuracy and the ingested volume of water. *Bulletin of the Canadian Society of Zoologists* 37(2), 15. Oral presentation at the annual meeting of the Canadian Society of Zoologists, Edmonton, Alberta, Canada.
- 10) Day S.W., **T.E. Higham**, and P.C. Wainwright. 2005. The relation of suction pressure and fluid speed during feeding in largemouth bass. *Integrative and Comparative Biology* 45(6), 985.
- 9) **Higham, T.E.**, S.W. Day, and P.C. Wainwright. 2005. Can peak buccal cavity pressure be used to predict peak fluid speed during suction feeding in fishes? *Integrative and Comparative Biology* 45(6), 1012. Oral presentation at the annual meeting of the Society for Integrative and Comparative Biology, Orlando, Florida, USA
- 8) Day, S.W., **T.E. Higham**, A.Y. Cheer, and P.C. Wainwright. 2004. Spatial and Temporal Flow Patterns during Suction Feeding of Bluegill by Particle Image Velocimetry. *Integrative and Comparative Biology* 44(6), 544.
- 7) **Higham, T.E.**, S.W. Day, and P.C. Wainwright. 2004. The effects of swimming speed on suction feeding in bluegill sunfish: flow quantification using Particle Image Velocimetry. *Integrative and Comparative Biology* 44(6), 568. Oral presentation at the annual meeting of the Society for Integrative and Comparative Biology, San Diego, California, USA.
- 6) **Higham, T.E.**, B. Malas, B.C. Jayne, and G.V. Lauder. 2004. Reduced pectoral fin surface area does not alter braking performance in bluegill sunfish. *Integrative and Comparative Biology* 44(6), 569. Oral presentation at the annual meeting of the Society for Integrative and Comparative Biology, San Diego, California, USA.
- 5) **Higham, T.E.** and B.C. Jayne. 2003. Effects of incline on the *in vivo* muscle activity in the hindlimb of the arboreal lizard, *Chamaeleo calyptratus*. *Integrative and Comparative Biology* 43(6), 910. Oral presentation at the annual meeting of the Society for Integrative and Comparative Biology, New Orleans, Louisiana, USA.
- 4) **Higham, T.E.** and B.C. Jayne. 2002. Locomotion of lizards on inclines and perches: Comparative three-dimensional hindlimb kinematics of an arboreal specialist (chameleon) and a terrestrial generalist. *Integrative and Comparative Biology* 42(6). Oral presentation at the annual meeting of the Society for Integrative and Comparative Biology, Toronto, Ontario, Canada
- 3) **Higham, T.E.** and B.C. Jayne. 2002. The effects of incline on the three-dimensional hindlimb kinematics of the arboreal lizard, *Chamaeleo calyptratus*. *The Physiologist* 45(4), 311. Poster presentation at the American Physiological Society meeting entitled "The Power of Comparative Physiology: Evolution, Integration, and Applied" in San Diego, California, USA.
- 2) **Higham, T.E.**, M.S. Davenport, and B.C. Jayne. 2001. How turning angle affects the locomotion of three sympatric ecomorphs of arboreal lizards. *Journal of Morphology* 248(3), 240. Oral presentation at the International Congress of Vertebrate Morphology, Jena, Germany.

- 1) **Higham, T.E.**, M.S. Davenport, W.B. Mattingly, and B.C. Jayne. 2000. Effects of turn angle on the sprinting performance of three sympatric ecomorphs of arboreal lizards. *American Zoologist* 40(6), 1056. Oral presentation at the annual meeting of the Society for Integrative and Comparative Biology, Chicago, Illinois, USA

INVITED SEMINARS:

- 2008: College of Charleston. Department of Biology.
- 2008: Georgia Southern University. Department of Biology.
- 2008: Clemson University. Environmental Toxicology.
- 2008: Clemson University. Department of Biological Sciences.
- 2008: University of Wyoming. Department of Zoology and Physiology.
- 2007: University of Missouri-Columbia. Integrative Anatomy.
- 2007: University of Guelph. Department of Biomedical Sciences.
- 2005: University of California, Davis. Molecular, Cellular and Integrative Physiology.

MEDIA ATTENTION:

- 2009: New York Times, Scientific American, Discovery News, Wired, Smithsonian, (Pub #20)
- 2009: Washington Post, Science Daily, Discovery News, Globe and Mail, Physics World (Pub #19)
- 2008: Inside JEB (2008: The Journal of Experimental Biology **211**)
- 2007: Harvard Gazette & HarvardScience (Pub #14)
- 2006: Inside JEB (The Journal of Experimental Biology **209(17)**, ii)
- 2006: Inside JEB (The Journal of Experimental Biology **209(14)**, iii)
- 2005: Inside JEB (The Journal of Experimental Biology **208(14)**, iii)

TEACHING EXPERIENCE:

Invited instructor, Biomechanics, Bamfield Marine Sciences Centre, Vancouver Island, Canada, Summer, 2010

Instructor and lab coordinator, Ichthyology (BIOSC 477), Clemson University, 2009.

Invited instructor, Biology of Fishes, Bamfield Marine Sciences Centre, Vancouver Island, Canada, Summer, 2009.

Instructor and lab coordinator, Comparative Physiology (BIOSC 475), Clemson University, 2009.

Guest lecturer, Comparative Biomechanics (OEB 173), Harvard University, 2008.

Teaching fellow, Independent Research (OEB 121A), Harvard University, 2007. This course involves mentoring undergraduate research projects. Students work with me to carry out independent projects in the area of muscle physiology.

Teaching assistant, Systemic Physiology, University of California, Davis, 2004-2006. Ran weekly labs and gave weekly lectures. Labs involved dissections and physiological experiments involving major physiological systems. Grading involved weekly quizzes and lab reports.

Teaching assistant, Comparative Vertebrate Anatomy, University of Cincinnati, 2002-2003. Ran weekly labs involving dissection and vertebrate classification. Generated and graded comprehensive laboratory examinations.

Teaching assistant, Anatomy and Physiology, University of Cincinnati, 2000-2003. Ran weekly labs involving extensive cat dissections.

Teaching assistant, Freshman Biology, University of Cincinnati, 2000. Ran weekly labs involving introductory biological experiments. Grading involved quizzes and lab reports.

FELLOWSHIPS AND AWARDS:

2008: NSERC postdoctoral fellowship (\$80,000 - declined)

2006: *Journal of Experimental Biology* Traveling Fellowship (\$3,300).

2006: William S. Hoar Award for best student oral presentation at the 2006 annual meeting of the Canadian Society of Zoologists (\$500).

2006: Fellowship for travel to the 2006 annual meeting of the Canadian Society of Zoologists (\$300).

2004: UC Davis Graduate fellowship (\$14,000).

2003: UC Davis Graduate fellowship (\$21,500).

2003: University of Cincinnati Harry L. Wieman Summer Fellowship (\$1,100).

2002: University of Cincinnati Harry L. Wieman Summer Fellowship (\$1,000).

FIELD WORK:

2009: Bamfield Marine Sciences Centre, Vancouver.

2000: Discovery Bay Marine Laboratory, Jamaica: Collected data regarding habitat use in *Anolis* lizards.

2000: Mojave Desert, USA: Studied and collected desert lizards.

1999: Bamfield Marine Station, Vancouver: Studied habitat selection in intertidal fishes.

1999: Monkey River, Belize: Studied the locomotor behavior of howler monkeys.

LAB MEMBERS:

Postdoctoral fellows:

Andrew Clark (August 2009 – present)

Graduate students:

Emily Kane (August 2009 – present)

Paul Korchari (August 2009 – present)

Undergraduates:

Patrick Fuller, Undergraduate (2009-present)

Heidi Lindler, Undergraduate (2009-present)

Katelyn Doerr, Undergraduate (2009-present)

Danielle Hulsey, Undergraduate (2009)

PROFESSIONAL ACTIVITIES:

Reviewed manuscripts for the following journals:

Behavioural Processes

Biology Letters

Bulletin of the Museum of Comparative Zoology

Canadian Journal of Zoology

Ecology

Experimental Neurology

Journal of Biomechanics

Journal of Comparative Physiology A

Journal of Evolutionary Biology

Journal of Experimental Biology

Journal of Fish Biology

Journal of the Royal Society Interface

North American Journal of Fisheries Management

Physiological and Biochemical Zoology

Zoology

Member of:

American Physiological Society
Canadian Society of Zoologists
International Society of Vertebrate Morphology
Society for Integrative and Comparative Biology

VOLUNTEER ACTIVITIES:

2007: Presenter and judge for Boston Latin School Science Fair