

CURRICULUM VITAE

Frank E. Nelson

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EDUCATION

- 2006 Ph.D. Department of Zoology, Oregon State University (mentor: T.J. Roberts)
Title: Energetics and Mechanics of Swing Phase during Terrestrial Locomotion.
- 2001 M.S. Department of Biological Sciences, University of Cincinnati (mentor: B.C. Jayne)
Title: The effects of speed on the in vivo activity and length of a limb muscle during the locomotion of the iguanian lizard *Dipsosaurus dorsalis*.
- 1997 B.A. Department of Biology, University of Pennsylvania (mentor: L.C. Rome)

POSTGRADUATE TRAINING

- 2012 – present **Adjunct Faculty**, Department of Biology, Temple University (S.T. Hsieh):
Neuromechanics and locomotion following limb loss in spiders, with application towards understanding recovery of neuromuscular function in humans due to disease or stroke.
- 2012 – present Postdoctoral Researcher, Department of Biology, University of Pennsylvania (L.C. Rome):
Excitation-contraction kinetics, metabolic cost and mechanics of sound producing muscles, with application to understanding activation and metabolic costs in normal and diseased muscle.
- 2009-2012 **Post-doctoral Fellow**, Department of Radiology, University of Washington (M.J. Kushmerick and K.E. Conley):
Efficiency of muscle contraction in humans using magnetic resonance and optical spectroscopy techniques. Led the development of a diagnostic test for movement disorders due to disease or blunt force trauma.
- 2006-2009 **Post-doctoral Researcher**, Biomechanics Group, University of Leeds, UK (G.N. Askew):
Mechanics and physiology of movement in birds and invertebrates, the efficiency of flight.

TEACHING RESPONSIBILITIES

Instructor

- 2012 Instructor, Biology 1111, Temple University: Taught two lab sections to supplement lecture material.
- 2004 (summer) Instructor, Human Anatomy and Physiology (cadaver-based), Oregon State University: Instructed 200 students about the nervous system, special senses, immune system, and reproductive system.

Teaching Assistant

- 2000-2004 Teaching assistant, Human Anatomy and Physiology, Oregon State University: Instructed two to three lab sections in general gross anatomy and physiology. Led the cadaver prosection (2002) to train the other teaching assistants for their labs.
- 1998-2000 Teaching Assistant, Vertebrate Zoology, University of Cincinnati: Topics taught included cladograms, vertebrate anatomy and physiology.
- 1997-2000 Teaching assistant, Anatomy and Physiology, University of Cincinnati: Taught undergraduate laboratories using a cat model.
- 1998 Teaching assistant, Introductory Biology, University of Cincinnati: Taught two lab sections on ecology, evolution, and basic anatomy and physiology to supplement lecture.

RELEVANT COURSES TAKEN

- Brown U. Medical School: Human Gross Anatomy
Oregon St. U.: Muscle Physiology, Comparative Biomechanics, Theory and Lab Techniques in Human Biomechanics I, II, and III
U. Cinn.: Vertebrate Zoology
U. Penn.: Vertebrate Physiology, Comparative Vertebrate Anatomy & Evolution (with Lab), Integrative Physiology

RESEARCH FUNDING

- 2009-2012 NIH Ruth Kirschstein National Research Service Award (1F32AG029064-01A1; \$153,822)

ACADEMIC AND PROFESSIONAL HONORS

2010-present	Associate Member, Faculty of 1000
2002-2003	Graduate Assistance in Areas of National Need Fellowship, U.S. Department of Education Grant (\$40,000)
1998	Harry L. Wieman Summer Fellowship, University of Cincinnati (\$1,000)-

EDITORIAL RESPONSIBILITIES

Invited reviews: Journal of Experimental Biology; Journal of Biomechanics; Journal of Applied Physiology; Proceedings of the Royal Society; Zoology; Scandinavian Journal of Medicine and Science in Sports

PROFESSIONAL ORGANIZATIONS

Society of Integrative and Comparative Biology, Society for Experimental Biology and Medicine, Faculty of 1000

PEER REVIEWED PUBLICATIONS

1. **Nelson, F.E.**, J. Ortega, S. Jubrias and M.J. Kushmerick, Does Human muscle have high efficiency? *J. Exp. Biol.* 2011 **214**:2649-2653.
2. Morris, C.R., **F.E. Nelson**, and G.N. Askew, The metabolic power requirements of flight and estimations of flight muscle efficiency in the cockatiel (*Nymphicus hollandicus*). *J. Exp. Biol.* 2010 **213**:2788-2796.
3. Higham, T.E., **F.E. Nelson**, Inferring Muscle Function from Kinematics: Lateral Gastrocnemius Function of Turkeys Running at Different Speeds on Surfaces with Varying Steepness. *Zoology*. 2008 **111**: 483-493.
4. **Nelson, F.E.**, T.J. Roberts, How Muscle Synergists Share Extension Force About the Intertarsal Joint during Locomotion in Turkeys. *J. Exp. Biol.* 2008 **211**: 1211-1220.
5. Gabaldón, A.M., **F.E. Nelson**, T.J. Roberts, Relative Shortening Velocity in Locomotor Muscles: Turkey Ankle Extensors Operate at Low V/Vmax. *Am. J. Physiol. Regul. Integr. Comp. Physiol.* 2008 **294**: R200–R210.
6. Roberts, T.J., B.K. Higginson, **F.E. Nelson**, A.M. Gabaldon, Muscle strain is modulated more with running slope than speed in wild turkey knee and hip extensors. *J. Exp. Biol.* 2007 **210**: 2510-2517.
7. Gabaldón, A.M., **F.E. Nelson**, and T.J. Roberts, Mechanical Function of Two Ankle Extensors in Wild Turkeys: Shifts from Energy Production to Energy Absorption During Incline versus Decline Running. *J. Exp. Biol.* 2004. **207**: 2277-2288.
8. **Nelson, F.E.**, A.M. Gabaldon, and T.J. Roberts, Force-Velocity Properties of Two Avian

- Hindlimb Muscles. *Comparative Biochemistry and Physiology Part A*, 2004. **137**: 711-721.
9. Kargo, W.J., **F. Nelson**, and L.C. Rome, Jumping in frogs: assessing the design of the skeletal system by anatomically realistic modeling and forward dynamic simulation. *J Exp Biol*, 2002. **205**(Pt 12): p. 1683- 1702.
 10. **Nelson, F.E.** and B.C. Jayne, The effects of speed on the in vivo activity and length of a limb muscle during the locomotion of the iguanian lizard *Dipsosaurus dorsalis*. *J Exp Biol*, 2001. **204**(Pt 20): p. 3507- 3522.

MANUSCRIPTS IN PREPARATION

1. **Nelson, F. E.**, J.O. Ortega, S.L. Lindstedt, S.A. Jubrias, and K.E. Conley, *Efficiency of positive and negative work in vivo: an innovative apparatus for human muscle studies*. In prep.
2. **Nelson, F.E.**, R.L. Marsh, and T.J. Roberts, *In Vivo Operating Lengths of an Avian Hindlimb Muscle During Locomotion Across Various Speeds and Inclines*. In prep.
3. **Nelson, F.E.**, and T.E. Higham, *Novel techniques for evaluating passive or active control of uphill locomotion*. In prep.
4. **Nelson, F.E.**, T.J. Roberts, *Power Transfer from the Knee to Ankle in the Swing Phase of Locomotion*. In prep.

PUBLISHED ABSTRACTS

Nelson, F.E., B.C. Jayne, *Effects of speed on the activity and length change in a locomotory muscle of a lizard*. *American Zoologist* 39 (5): 618 Sp. Iss. SI 1999

Nelson, F.E., A.M. Gabaldón, T.J. Roberts, *Force-velocity properties of an avian hindlimb muscle*. *American Zoologist* 41 (6): 1537-1537 Dec 2001

Gabaldón, A.M., **F.E. Nelson**, T.J. Roberts, *Gastrocnemius muscle mechanics in turkeys during uphill and downhill running*. *American Zoologist* 41 (6): 1448-1448 Dec 2001

Nelson, F.E., T.J. Roberts, *In vivo lengths and velocities of a turkey limb muscle during the swing phase of running*. *FASEB JOURNAL* 18 (4): A748-A749 Suppl. S Mar. 23 2004

Gabaldon, A.M., **F.E. Nelson**, T.J. Roberts, *Force-velocity characteristics of ankle extensor muscles in wild turkeys during running and in situ*. *Integrative and Comparative Biology* 43 (6): 1030-1030 Dec. 2003

Roberts, T.J., B.K. Higginson, **F.E. Nelson**, A.M. Gabaldón, *Versatile function of muscle stretch-shorten cycles during running*. *Integrative and Comparative Biology* 43 (6): 910-910 Dec. 2003

Nelson, F. E., K. Conley, and M. Kushmerick, *Defining the limits to efficiency in human muscle in vivo*. *FASEB JOURNAL* 24: 801.6 March 2010

INVITED SEMINARS

- 2006 Oregon State University, Department of Zoology
- 2006 University of Leeds, Department of Biological Sciences
- 2007 Harvard University, Department of Organismic and Evolutionary Biology
- 2009 University of Washington, Department of Radiology
- 2009 University of Cincinnati, Department of Biological Sciences
- 2009 Brown University, Department of Ecology and Evolutionary Biology
- 2010 University of Washington, Integrative Brain Imaging Center