

Timothy C. Roth II

Department of Biology
Kenyon College
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PROFESSIONAL PREPARATION

- 2006 **Doctor of Philosophy.** Indiana State University. Terre Haute, IN.
Phi Kappa Phi
- 1999 **Master of Science.** Missouri State University. Springfield, MO.
- 1997 **Bachelor of Arts, Magna Cum Laude.** Cornell College. Mt. Vernon, IA.
Phi Beta Kappa, Beta Beta Beta

PROFESSIONAL APPOINTMENTS

- 2011- **Visiting Assistant Professor,** Kenyon College
- 2007-2011 **Postdoctoral Research Associate,** University of Nevada, Reno
(Research supported by NSF IOB-0615021, NIH MH-079892 and MH-076797
to V. Pravosudov)
- 2006-2007 **Postdoctoral Research Associate,** Indiana State University
- 2003-2006 **Research Assistant,** Indiana State University
(Research supported by NSF IBN-0130758 to S. Lima)
- 1998 **Research Assistant,** Missouri State University
- 1997 **Research Technician,** University of Minnesota

TEACHING EXPERIENCES (sections)

- Fall 2011- **Instructor,** Kenyon College
 Courses: Energy in Living Systems (1)
 Introduction to Experimental Biology (1, spring)
 Comparative Animal Physiology (spring)
 Experimental Animal Physiology (spring)
- 2010-2011 **Guest Lecturer,** University of Nevada, Reno
 Course: Principles of Animal Behavior (2)

- 2000-2006 **Guest Lecturer**, Indiana State University
 Courses: The Care and Use of Animals in Research (4)
 Principles of Biology for Majors I and II (4)
 Principles of Wildlife Management (1)
- 2000-2003 **Instructor**, Indiana State University
 Courses: Principles of Biology Lab for Majors I and II (8)
- 1999-2003 **Graduate Teaching Assistant**, Indiana State University
 Courses: Principles of Biology Lab for Majors I and II (19)
- 1997-1999 **Graduate Teaching Assistant**, Missouri State University
 Course: Principles of Biology Lab for Majors I (4)
- 1999 **Instructor**, Missouri State University
 Course: General Ornithology Lab (1)
- 1999 **Guest Lecturer**, Missouri State University
 Course: General Ornithology (1)

STUDENT MENTORING

Undergraduate Mentoring (26 total; 3 honors theses, 19 from underrepresented groups)

Students advised directly on formal research projects:
 (The remaining students I mentored and supervised at varying levels.)
 *indicates NSF REU recipient

Kenyon/UNR

*Dominique Chevalier – glial cell abundance in the hippocampus (*co-author*)

UNR

*Caitlin Gallagher – neuron density and volume in alternative regions (*co-author*)

Yvette Hollett – with honors – neurogenesis in the hippocampus

*Leia Chancellor – with honors – neurogenesis in the hippocampus (*primary author*)

Genevieve Hanson – caching behavior, hand-raising

Kathleen Cornfield – brain analyses

ISU

Rebekah Borders – information transfer

Brian Thomas – hawk movement and radio-tracking

MSU

Julie Berger – snake movement and radio-tracking, habitat analysis

Skills taught:

Academic: Experimental design, behavioral observation, data collection, data analysis, scientific writing, reading scientific papers, time management.

Techniques: Immunohistochemistry, StereoInvestigator, microscopy technique, brain morphology analyses (region identification, volume, neuron number, cell distinctions), RNA extraction and isolation, brain dissection, perfusion techniques, cryostat technique, tissue sectioning and mounting, hand-raising birds, animal trapping and handling (raptors, passerines, lizards, and snakes), avian husbandry, radio telemetry (raptors, passerines, snakes), terrestrial and aquatic vegetation sampling, avian identification, reptile identification, venomous snake first aid and handling.

GRANTS AND AWARDS

- 2010 Sequencing the chickadee genome. University of Nevada. \$10,000 (Co-PI with V. Pravosudov and A. van der Linden).
- 2006 Best Graduate Student Poster. Indiana State University Research Showcase. (\$100 award).
- 2006 Runner-up Graduate Student Presentation. Indiana State University Research Showcase. (\$50 award to co-author).
- 2006 Sleep Research Society Honorable Mention Award. Sleep 2006 20th Anniversary Meeting of the Associated Professional Sleep Societies. (\$300 award to co-author).
- 2005 William C. Anderson Memorial Award. Annual Meeting of the Raptor Research Foundation. (1 year membership and \$125 award).
- 2005 Best Overall Paper, Best Graduate Student Paper, Best Paper in Section. Graduate Research Showcase. Indiana State University. (\$750 combined award).
- 2002-2004 Multiple Titles. Indiana State University Office of Sponsored Programs. (\$600 combined funds). (PI with S. Lima).
- 2001 The predatory behavior of Sharp-shinned Hawks: an examination of the smallest *Accipiter*. Indiana Academy of Sciences. \$1400. (PI with S. Lima).
- 2000-2006 Multiple Titles. Indiana State University Graduate School Research Fund. (\$2800 combined funds). (PI with S. Lima).
- 2000 The predatory behavior of Sharp-shinned and Cooper's Hawks: life in a bird-eat-bird world. Indiana Academy of Sciences. \$1500. (PI with S. Lima).

1999 Travel grant. Southwest Missouri State University. \$500.

PUBLICATIONS (h-index = 10)

Manuscripts in Preparation (3)

40. **Roth, T.C.**, D. Chevalier*, L. D. LaDage, and V.V. Pravosudov. *In prep.* Variation in hippocampal glial cell numbers in different climates. *Undergraduate author.
39. Lima, S.L., **T.C. Roth**, W.E. Vetter, and G.S. Bakken. *In prep.* Patterns of feeder use: can small birds predict the weather?
38. **Roth, T.C.**, L.D. LaDage, and V.V. Pravosudov. *In prep.* Adventures in brain analysis: the problems with ratios, traditions, and vague hypotheses.

Manuscripts in Review/Revision (1)

37. **Roth, T.C.**, C. Gallagher*, L.D. LaDage, and V.V. Pravosudov. *In revision.* Variation in brain regions associated with learning in contrasting climates. *Undergraduate author.

Peer-reviewed Articles (36)

2011

36. **Roth, T.C.**, L.D. LaDage, and V.V. Pravosudov. 2011. Long-term memory in a food-caching parid. *Animal Cognition*. *In press.*
35. **Roth, T.C.**, L.D. LaDage, C. Freas, and V.V. Pravosudov. 2011. Variation in memory and the hippocampus across populations from different climates: a common garden approach. *Proceedings of the Royal Society B*. *In press.*
34. **Roth, T.C.**, L.D. LaDage, and V.V. Pravosudov. 2011. Variation in hippocampal morphology along an environmental gradient: controlling for the effects of latitude. *Proceedings of the Royal Society B*. *In press.* Featured in *New Scientist*.
33. Chancellor, L.V.* , **T.C. Roth**, L.D. LaDage, and V.V. Pravosudov. 2011. The effect of environmental harshness on neurogenesis: a large-scale comparison. *Developmental Neurobiology*. 71:246-252. *Undergraduate author.
32. Rattenborg, N.C., D. Martinez-Gonzalez, **T.C. Roth**, and V.V. Pravosudov. 2011. Hippocampal memory consolidation during sleep: a comparison of mammals and birds. *Biological Reviews*. *In press.*

2010

31. **Roth, T.C.**, L.D. LaDage, and V.V. Pravosudov. 2010. Learning capabilities enhanced in harsh environments: a common garden study. *Proceedings of the Royal Society B* 277:3187-3193. Highlighted in *Nature*. To be featured on BBC's "Animal Einsteins".
30. Pravosudov, V.V., **T.C. Roth**, and L.D. LaDage. 2010. Chickadees are selfish group members when it comes to food caching. *Animal Behaviour* 80:175-180. *In focus* article in *Animal Behaviour*.
29. LaDage, L.D., **T.C. Roth**, and V.V. Pravosudov. 2010. Hippocampal neurogenesis is associated with migratory behavior in adult but not juvenile white-crowned sparrows (*Zonotrichia leucophrys* ssp.). *Proceedings of the Royal Society B* 278:138-143.
28. **Roth, T.C.**, A. Brodin, T.V. Smulders, L.D. LaDage, and V.V. Pravosudov. 2010. Is bigger always better? A critical appraisal of the use of volumetric analysis in the study of the hippocampus. *Philosophical Transactions of the Royal Society B* 365:915-931. Erratum: 2010; 365:2423.
27. **Roth, T.C.**, N.C. Rattenborg, and V.V. Pravosudov. 2010. The ecological relevance of sleep: the trade-off between sleep, memory, and energy conservation. *Philosophical Transactions of the Royal Society B* 365:945-959.
26. Fox, R.A., **T.C. Roth**, L.D. LaDage, and V.V. Pravosudov. 2010. Effects of social group composition and size on hippocampal formation morphology and neurogenesis in mountain chickadees (*Poecile gambeli*). *Developmental Neurobiology* 70:538-547.
25. Steury, T.D., J.E. McCarthy, **T.C. Roth**, S.L. Lima, and D.L. Murray. 2010. Evaluation of root-n bandwidth selectors for kernel density estimation. *Journal of Wildlife Management* 74:539-548.
24. LaDage, L.D., **T.C. Roth**, R.A. Fox, and V.V. Pravosudov. 2010. Ecologically-relevant spatial memory use modulates hippocampal neurogenesis. *Proceedings of the Royal Society B* 277:1071-1079.

2009

23. **Roth, T. C.** and V. V. Pravosudov. 2009. Hippocampal volume and neuron numbers increase along a gradient of environmental harshness: a large-scale comparison. *Proceedings of the Royal Society B* 276:401-405. Featured in *Down to Earth*.
22. LaDage, L.D., **T.C. Roth**, and V.V. Pravosudov. 2009. Biases in measuring the brain: the trouble with the telencephalon. *Brain, Behavior, and Evolution* 73:253-258. Erratum: 2010; 76:70.

21. Lesku, J.A., **T.C. Roth**, N.C. Rattenborg, C.J. Amlaner, and S.L. Lima. 2009. History and future of comparative analyses in sleep research. *Neuroscience and Biobehavioral Reviews* 33:1024-1036.
20. **Roth, T. C.** and V. V. Pravosudov. 2009. Tough times call for bigger brains. *Communicative and Integrative Biology* 2(3):1-3. Invited article.
19. Fox, R.A., L.D. LaDage, **T.C. Roth**, and V.V. Pravosudov. 2009. Temperament traits predict dominance status in mountain chickadees. *Animal Behaviour* 77:1441-1448.
18. LaDage, L.D., **T.C. Roth**, R.A. Fox, and V.V. Pravosudov. 2009. Flexible cue use in food-caching birds? *Animal Cognition* 12:419-426.
17. LaDage, L.D., **T.C. Roth**, R.A. Fox, and V.V. Pravosudov. 2009. Effects of captivity and memory-based experiences on the hippocampus of mountain chickadees. *Behavioral Neuroscience* 123:284-291. Recommended by the Faculty of 1000 Biology.

2008

16. **Roth, T.C.**, J.G. Cox, and S.L. Lima. 2008. Can foraging birds assess predation risk by scent? *Animal Behaviour* 76:2021-2027. Highlighted in *Nature*. Featured on *BBC Wildlife*.
15. **Roth, T.C.**, J.G. Cox, and S.L. Lima. 2008. The use and sharing of information about predation risk by flocks of wintering finches. *Ethology* 114:1218-1226.
14. **Roth, T.C.**, W.E. Vetter, and S.L. Lima. 2008. Spatial ecology of wintering Accipiter hawks: home range, habitat use, and the influence of feeders. *Condor* 110:260-268.
13. **Roth, T.C.**, and W.E. Vetter. 2008. The effect of feeder hotspots on the predictability and home range use of a small bird in winter. *Ethology* 114: 398-404.
12. Lesku, J.A., **T.C. Roth**, N.C. Rattenborg, C.J. Amlaner, and S.L. Lima. 2008. Phylogenetics and the correlates of mammalian sleep: a reappraisal. *Sleep Medicine Reviews* 12:229-244. Featured in *New Scientist*, *National Public Radio*.
11. Angilletta, M.J., **T.C. Roth**, R.S. Wilson, A.C. Niehaus, and P.L. Ribeiro. 2008. The fast and the fractalous: thermal sensitivity of speed and tortuosity in running ants. *Functional Ecology* 22:78-83.

2007

10. **Roth, T.C.**, and S.L. Lima. 2007. The predatory behavior of wintering *Accipiter* hawks: temporal patterns in activity of predators and prey. *Oecologia* 152 (1): 169-178. Featured in *Birder's World*.

9. **Roth, T.C.**, and S.L. Lima. 2007. Use of predictable prey hotspots by an avian predator: purposeful randomness? *The American Naturalist* 169 (2): 264-273. Featured in *Birder's World*.

2006

8. **Roth, T.C.**, and S.L. Lima. 2006. Predatory behavior and diet of wintering male Cooper's hawks in a rural habitat. *Journal of Raptor Research* 40 (4): 287-290.
7. **Roth, T.C.**, J.A. Lesku, C.J. Amlaner, and S.L. Lima. 2006. A phylogenetic analysis of the correlates of sleep in birds. *Journal of Sleep Research* 15 (4): 395-402. Featured in *New Scientist*, *National Public Radio*.
6. Lesku, J.A., **T.C. Roth**, C.J. Amlaner, and S.L. Lima. 2006. A phylogenetic analysis of sleep architecture in mammals: the influence of anatomy, physiology, and ecology. *The American Naturalist* 168 (4): 441-453. Featured on *Bayerische Rundfunk*, *New Scientist*, *National Public Radio*.
5. **Roth, T.C.**, and B.D. Greene. 2006. Movement patterns and home range use of the northern watersnake (*Nerodia sipedon*). *Copeia* 2006 (3): 543-550.
4. **Roth, T.C.**, S.L. Lima, and W.E. Vetter. 2006. Determinants of predation risk in small wintering birds: a hawk's perspective. *Behavioral Ecology and Sociobiology* 60 (2):195-204.

2005

3. **Roth, T.C.**, S.L. Lima, and W.E. Vetter. 2005. Survival and causes of mortality in wintering Sharp-shinned Hawks and Cooper's Hawks. *Wilson Journal of Ornithology* 117 (3): 237-244.

2003

2. **Roth, T.C.**, and S.L. Lima. 2003. Hunting behavior and diet of Cooper's Hawks: An urban view of the small-bird-in-winter paradigm. *Condor* 105 (3): 474-483. Featured in *Berkeley Daily Planet*, *Tribune Star*.
1. Lima, S.L., W.A. Mitchell, and **T.C. Roth**. 2003. Predators feeding on behaviorally responsive prey: some implications for the classical models of optimal diet choice. *Evolutionary Ecology Research* 5 (7): 1083-1102.

Articles Written for Non-technical Venues (2)

- Roth, T.C.**, and V. V. Pravosudov. 2008. Tough times call for bigger brains. *Tallgrass Gazette*. Konza Prairie Biological Station.

Roth, T. C., and S. L. Lima. 2007. Is Your Bird Feeder Actually a Hawk Feeder? *Tallgrass Gazette*. Konza Prairie Biological Station.

Published Abstracts (7)

Roth, T.C., L.D. LaDage, and V.V. Pravosudov. 2011. *Integrative and Comparative Biology* 51:E118.

LaDage, L.D., **T.C. Roth**, and V.V. Pravosudov. 2011. *Integrative and Comparative Biology* 51:E75.

Chancellor, L.V.*, **T.C. Roth**, L.D. LaDage, and V.V. Pravosudov. 2011. *Integrative and Comparative Biology* 51: E23. *Undergraduate author.

Fox, R.A., L.D. LaDage, **T.C. Roth**, and V.V. Pravosudov. 2010. *Integrative and Comparative Biology* 50:E55.

Lesku, J.A., **T.C. Roth**, S.L. Lima, and C.J. Amlaner. 2006. *Journal of Sleep Research* 15 (Suppl.): 101-102.

Lesku, J.A., **T.C. Roth**, S.L. Lima, and C.J. Amlaner. 2006. *Sleep* 29 (Suppl.): 35.

Lesku, J.A., **T.C. Roth**, S.L. Lima, and C.J. Amlaner. 2005. *Sleep* 28 (Suppl.): 15-16.

PRESS COVERAGE

Animal Behaviour (2010), *Bayerische Rundfunk* (German TV; 2007), *BBC's "Animal Einsteins"* series (*in production*), *BBC Wildlife* (June 2009), *Berkeley Daily Planet* (2004), *Birder's World* (2007), *Down to Earth* (2010), *Faculty of 1000 Biology* (Apr 24, 2009), *Nature* (Nov 20, 2008; June 10, 2010), *New Scientist* (2008, 2008, 2008, 2011), *National Public Radio* (2007, 2008), *St. Albert Gazette* (2011), *Tribune Star* (2006).

PRESENTATIONS

Invited Presentations (15)

Roth, T.C. 2011. California State University, Fresno. *Invited seminar.*

Roth, T.C. 2011. Kenyon College. *Invited seminar.* Seminar (1), lecture (1).

Roth, T.C. 2011. Ohio Wesleyan University. *Invited seminar.* Seminar (1), lecture (1).

Roth, T.C. 2010. Washington College. Sigma Xi initiation ceremony speaker. *Invited seminar.*

Roth, T.C. 2009. Cornell College Connections Series. *Invited seminar.* Public seminar (1), lectures (2).

Roth, T.C. 2008. University of Maine, Presque Isle. *Invited lecture.*

- Roth, T.C.** 2008. Cornell College. *Invited lecture.*
- Roth, T.C.** 2008. University of Nevada, Reno. *Invited seminar.*
- Roth, T.C.** 2006. Indiana State University. *Invited seminar.*
- Lesku, J.A., **T.C. Roth**, S.L. Lima, and C.J. Amlaner. 2006. 20th Anniversary Meeting of the Associated Professional Sleep Societies. *Invited symposium.*
- Roth, T.C.** 2001. Cornell College. *Invited seminar.*

Contributed Presentations (26, excludes published abstracts above)

- Roth, T.C.**, C. Freas, L.D. LaDage, and V.V. Pravosudov. 2011. Animal Behavior Society.
- Pravosudov, V.V., **T.C. Roth**, and L.D. LaDage. 2011. Animal Behavior Society.
- Freas, C., L.D. LaDage, **T.C. Roth**, and V.V. Pravosudov. 2011. Animal Behavior Society.
- Roth, T.C.**, L.D. LaDage, and V.V. Pravosudov. 2010. Animal Behavior Society.
- LaDage, L.D., **T.C. Roth**, and V.V. Pravosudov. 2010. Animal Behavior Society.
- Pravosudov, V.V., **T.C. Roth**, and L.D. LaDage. 2010. Animal Behavior Society.
- Rattenborg, N.C., D. Martinez-Gonzalez, **T.C. Roth**, and V.V. Pravosudov. 2010. 20th Congress of the European Sleep Research Society.
- Roth, T. C.** and V. V. Pravosudov. 2008. International Society for Behavioral Ecology.
- Roth, T. C.** and V. V. Pravosudov. 2008. International Society for Behavioral Ecology. Pre-conference symposium.
- Fox, R.A., L.D. LaDage, **T.C. Roth**, and V.V. Pravosudov. 2008. International Society for Behavioral Ecology.
- Fox, R.A., **T.C. Roth**, L.D. LaDage, and V.V. Pravosudov. 2008. International Society for Behavioral Ecology. Pre-conference symposium.
- LaDage, L.D., **T.C. Roth**, R.A. Fox, and V.V. Pravosudov. 2008. International Society for Behavioral Ecology.
- Roth, T.C.**, J.G. Cox, and S.L. Lima. 2007. Animal Behavior Society.
- Roth, T.C.**, J.G. Cox, and S.L. Lima. 2006. Animal Behavior Society.
- Roth, T.C.**, and S.L. Lima. 2006. Indiana State University Research Showcase. See Awards.
- Lesku, J.A., **T.C. Roth**, S.L. Lima, and C.J. Amlaner. 2006. Indiana State University Research Showcase. See Awards.
- Roth, T.C.**, and S.L. Lima. 2005. Raptor Research Foundation. See Awards.
- Roth, T.C.**, and S.L. Lima. 2005. Animal Behavior Society.
- Roth, T.C.**, and S.L. Lima. 2005. American Ornithologists' Union.
- Lesku, J.A., **T.C. Roth**, S.L. Lima, and C.J. Amlaner. 2005. Indiana State University.
- Roth, T.C.**, and S.L. Lima. 2005. Indiana State University Graduate Research Showcase. See Awards.
- Roth, T.C.**, S.L. Lima, and W.E. Vetter. 2003. American Ornithologists' Union.
- Roth, T.C.**, and S.L. Lima. 2002. Animal Behavior Society.
- Roth, T.C.**, and B.D. Greene. 1999. Missouri Herpetological Society.
- Roth, T.C.**, and B.D. Greene. 1999. ASIH, AES, HL, and SSAR.
- Roth, T.C.**, and B.D. Greene. 1999. ASIH, AES, HL, and SSAR.

SERVICE

2009-present **Ad hoc proposal review** (3) for: National Geographic Society, National Science Foundation.

2001-present **Ad hoc manuscript reviewer** (82) for: *American Midland Naturalist*, *American Naturalist*, *Animal Behaviour*, *Animal Cognition*, *Behavioral Ecology*, *Behavioral Ecology and Sociobiology*, *Behavioural Processes*, *Biology Letters*, *Canadian Journal of Zoology*, *Condor*, *Copeia*, *Ecology*, *Ethology*, *Evolution*, *Herpetologica*, *Ibis*, *Israel Journal of Ecology and Evolution*, *Journal of Animal Ecology*, *Journal of Avian Biology*, *Journal of Ethology*, *Journal of Field Ornithology*, *Journal of Ornithology*, *Journal of Raptor Research*, *Naturwissenschaften*, *Oecologia*, *Oikos*, *Philosophical Transactions of the Royal Society B*, *PLoS One*, *Studies in Avian Biology*, *Waterbirds*, *Wildlife Society Bulletin*, *Wilson Journal of Ornithology*.

OUTREACH

- 2011 Ornithology lecture for Dilworth Middle School, Sparks, NV.
- 2009 Cornell College Connections Series. High school lectures (2), Cedar Rapids, IA.
- 2007 Seminar for Konza Prairie Biological Station, Manhattan, KS. (with V. Pravosudov)
- 2007 Seminar for Konza Prairie Biological Station, Manhattan, KS. (with S. Lima)
- 2006 Seminar for Indiana Audubon Society, Turkey Run State Park, IN.
- 2004 Research seminar for Golden Gate Raptor Observatory. (by M. McCaustland, with S. Lima)
- 2002 Poster for Terre Haute Parks and Recreation, Terre Haute, IN. (with S. Lima)
- 1998 Research seminar for Missouri Department of Conservation, Springfield, MO. (with B. Greene)
- 1998 Research poster for Missouri Department of Conservation, Springfield, MO. (with B. Greene)
- 1997-present Community liaison for the retrieval and disposal of displaced wildlife.
- 1997-present Judge for local and regional elementary, middle, and high school science fair competitions (10 total).

REFERENCES

Post-doctoral advisor

Dr. Vladimir V. Pravosudov
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Dissertation advisor

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Collaborator

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