

CURRICULUM VITAE: LAURA SMALE

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Education:

Ph.D., University of California, Berkeley, Jan. 1987 Psychobiology
B.A., University of California, Berkeley, 1982 Psychobiology

Current positions:

2002-present	Professor, Department of Psychology, Michigan State University
2002-present	Professor, Department of Zoology, Michigan State University
1992-present	Member of MSU Neuroscience Program
1992-present	Member of MSU program in Ecology, Evolution and Behavioral Biology

Other positions held:

1997-2002	Associate Professor, Psychology Department, Michigan State University
1992-1997	Assistant Professor, Psychology Department, Michigan State University
1989-1992	Research Associate, State University of New York, Stony Brook
1987-1988	Post-doctoral Fellow, State University of New York, Stony Brook
1982-1987	Graduate student Teaching Assistant, University of California, Berkeley
1982-1987	Graduate student Research Assistant, University of California, Berkeley

Honors:

Editorial Board, *Physiological and Biochemical Zoology*, 2014-present.
Editorial Board, *Hormones and Behavior*, 1999-present
Editorial Board, *Journal of Biological Rhythms*, 2001-2014
Gordon Conference invitee, 2005
Recipient of the Frank A. Beach award, Society for Behavioral Neuroendocrinology, 1994
American Association of University Women, Postdoctoral fellowship, 1989-1990

Current grant support:

National Science Foundation, Chronotype differences in the acute behavioral responses to light and darkness and in their neural substrates, Principle Investigator: Laura Smale, Co-Principle Investigators: Lily Yan and Antonio A. Nunez, 2011-2016

National Science Foundation, Center for the Study of Evolution in Action (BEACON), Temporal niche evolution: plastic & mosaic activity patterns at center stage, Laura Smale, Barbara Lundrigan, Arend Hintz

Past grant support:

National Science Foundation, Center for the Study of Evolution in Action (BEACON), The Evolution of Temporal Niche Transitions, Principle Investigator: Barbara Lundrigan, Co-Principle Investigator: Laura Smale, 2014-2015

National Institute of Mental Health, The psychobiology of rhythms in diurnal mammals, Principle investigator: Laura Smale, Co-investigators: Antonio A. Nunez, David Weaver, 2007-2012

United States-Israel Binational Science Foundation, The neural mechanisms of daily rhythms and their plasticity in *Acomys russatu*, Principle Investigator: Noga Kronfeld-Schor, Co-Principle Investigator: Laura Smale, 2006-2009

National Institute of Mental Health, The psychobiology of rhythms in diurnal mammals, Principle investigator: Laura Smale, Co-investigators: Antonio A. Nunez, David Weaver, 2002-2007

National Science Foundation, Mammalian behavioral development under contrasting regimes of interspecific competition, Principle Investigator: Kay E. Holekamp, Co-Principle Investigator: Laura Smale, 2003-2008

National Science Foundation, Neuroendocrine determinants of mating in the day versus night, Principle Investigator: Laura Smale, Co-Principle Investigators: Cheryl Sisk, Kristine Krajnek, 2002-2006

United States-Israel Binational Science Foundation, The neural mechanisms of daily rhythms and their plasticity in *Acomys russatu*, Principle Investigator: Noga Kronfeld-Schor, Co-Principle Investigator: Laura Smale, 2003-2005

National Science Foundation, Mammalian sibling rivalry, Principle Investigator: Kay Holekamp, Co-Principle Investigator: Laura Smale, 2000-2006

National Institute of Mental Health, The psychobiology of rhythms in diurnal mammals, Principle Investigator: Laura Smale

National Science Foundation, The evolution of intelligence in response to social complexity, Principle Investigator: Kay Holekamp, Co-Principle Investigators: Laura Smale, 1997-2000

All University Research Investigators Grant, MSU, Intraspecific variation in patterns of circadian rhythmicity, Principle Investigator: Laura Smale, 1999

National Institute of Mental Health, The psychobiology of rhythms in diurnal mammals, Principle Investigator: Laura Smale, 1994-1997

National Science Foundation, Rank and reproduction in free-living spotted hyenas, Principle Investigator: Kay Holekamp, Co-Principle Investigator Laura Smale, 1994-1997

All University Research Investigators Grant, MSU, Hormonal modulation of circadian rhythmicity, 1993

National Science Foundation, Dispersal and mating in free-living spotted hyenas, 1991-1994, Principle Investigator: K. Holekamp; Co-Principle Investigators: L. Smale

Publications:

1. Research Reports

Gall AJ, Shuboni DD, Yan L, Nunez AA and Smale L, Suprachiasmatic Nucleus and Subparaventricular Zone Lesions Disrupt Circadian Rhythmicity but Not Light-Induced Masking Behavior in Nile Grass Rats, *Journal of Biological Rhythms*, 2016, 31:170-181.

Langel J, **Smale L**, Esquivia G and Hannibal J, Central melanopsin projections in the diurnal rodent, *Arvicanthis niloticus*, *Frontiers in Neuroanatomy*, Vol. 9, article 93.

Shuboni DD, Cramm SL, Yan L, Ramanathan C, Cavanaugh BL, Nunez AA and **Smale L**, Acute effects of light on the brain and behavior of diurnal *Arvicanthis niloticus* and nocturnal *Mus Musculus*, *Physiology and Behavior*, 2015, 38:75.

Gall AJ, Yan L, **Smale L** and Nunez AA, Intergeniculate leaflet lesions result in differential activation of brain regions following the presentation of photic stimuli in Nile grass rats, *Neuroscience Letters*, 2014, 579: 101.

Langel J, Yan L, Nunez AA, and **Smale L**, Behavioral masking and cFos responses to light in day and night active grass rats, *Journal of Biological Rhythms*, 2014, 29:192.

Castillo-Ruiz, A, Gall AJ, **Smale L**, Nunez, AA, Day-night differences in neural activation in histaminergic and serotonergic areas with putative projections to the cerebrospinal fluid in a diurnal brain, *Neuroscience*, 2013, 250:352.

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Shuboni DD, Cramm S, Yan L, Nunez AA, and **Smale L**, Acute behavioral responses to light and darkness in nocturnal *Mus musculus* and diurnal *Arvicanthis niloticus*, *Jornal of Biological rhythms*, 2012, 27:299-307.

Schrader JA Nunez, AA and **Smale L**, Site-specific changes in brain extra-SCN oscillators during early pregnancy in the rat, *Journal of Biological Rhythms*, 2011, 26:363-367.

Schwartz MD, Urbanski HF, Nunez AA, and **Smale L**, Projections of the subrachiasmatic nucleus and the ventral portion of the subparaventricular zone in the Nile grass rat (*Arvicanthis niloticus*), *Brain Research*, 2010, 1367:145-161.

Schrader JA, Nunez AA, **Smale L**, Changes in and dorsal to the suprachiasmatic nucleus during early pregnancy, *Neuroscience*, 2010, 171:513-523.

Ramanathan C, Stowie A, **Smale L** and Nunez AA, Phase preference for the display of activity is associated with the phase of extra-suprachiasmatic nucleus oscillators within and between species, *Neuroscience*, 2010, 170:758-772.

Ramanathan C, Stowie A, **Smale L** and Nunez AA, PER2 rhythms in the amygdala and bed nucleus of the stria terminalis of the diurnal grass rat (*Arvicanthis niloticus*), *Neuroscience Letters*, 2010, 473:220-223.

Cohen, R, Kronfeld-Schor, N and **Smale, L**, The supraciasmatic nucleus of *Acomys Rusatus* and *Acomys cahirinus*, nocturnal and diurnal congeners, *Brain, Behavior and Evolution*, 2010, 75:9-22.

Castillo-Ruiz A, Nixon JP, **Smale L** and Nunez AA, Neural activation in arousal and reward areas of the brain in day-active and night-active grass rats, *Neuroscience*, 2010, 165: 337-349.

Cohen R, **Smale L** and Kronfeld-Schor N, Masking and temporal niche switching in spiny mice, *Journal of Biological Rhythms*, 2010 25:47-52.

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- Manoney, MM, Ramanatham C and **Smale, L**, Tyrosine hydroxylase positive neurons and their contacts with vasoactive intestinal polypeptide-containing fibers in the hypothalamus of the diurnal murid rodent, *Arvicanthus niloticus*, *Brain Research*, 2007, 33:131-139.
- Novak, C, Parfitt, D, Sisk, C and **Smale, L**, Associations between behavior, hormones and Fos responses to novelty differ in pre- and post-pubertal grass rats, *Physiology and Behavior*, 2006, 90: 125-132.
- Ramanathan, C, Nunez, AA, Schwartz, MD, Martinez, G and **Smale, L**, Temporal and spatial distribution of immunoreactive PER1 and PER2 proteins in the suprachiasmatic nucleus and peri-suprachiasmatic region of the diurnal grass rat (*Arvicanthis niloticus*), *Brain Research.*, 2006, 1073: 348-358.
- Schwartz, M and **Smale, L.**, Individual differences in rhythms of behavioral sleep and its neural substrates in Nile grass rats, *Journal of Biological Rhythms*, 2005, 20: 526-537.
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- Mahoney, MM and **Smale, L**, A daily rhythm in mating behavior in a diurnal murid rodent *Arvicanthis niloticus*, *Hormones and Behavior*, 2005, 47:8-13.
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- Schwartz, M, Nunez, AA and **Smale, L**, Differences in the suprachiasmatic nucleus and lower subparaventricular zone of diurnal and nocturnal rodents, *Neuroscience*, 2004, 127:25-34.

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Holekamp, K.E., Szykman, Boydston, E.E. and **Smale**, L. Association of seasonal reproductive patterns with changing food availability in an equatorial carnivore, the spotted hyena (*Crocuta crocuta*) *Journal of Reproduction and Fertility*, 1999, 116:87-93.

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Holekamp, K.E. and **Smale**, L., Dispersal status influences hormones and behavior in the male spotted hyena, *Hormones and Behaviour*, 1998, 33:205-216.

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2. Book Chapters and Review Articles

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Frank, L.G., Holekamp, K.E. and **Smale**, L. Demographics, dominance and reproductive success in female spotted hyenas. In: *Serengeti II: Dynamics, management, and conservation of an ecosystem*, Ed: Sinclair, A.R.E. and Arcese, P., The University of Chicago Press: Chicago, 1995.

Glickman, S.E., L.G. Frank, K.E. Holekamp, L. **Smale**, and P. Licht. Costs and benefits of "androgenization" in the female spotted hyena: The natural selection of physiological mechanisms. In *Perspectives in Ethology*, Vol. 10, Behavior and Evolution. pp. 87-117. Ed. by P.P.G. Bateson, P.H. Klopfer and N.S. Thompson. New York: Plenum Press, 1993.

Holekamp, K. E. and **Smale**, L, Dominance acquisition during mammalian social development: the "inheritance" of maternal rank, *American Zoologist*, 1991, 31: 306-317.

Morin, L.P., Michels, K.M., **Smale**, L. and Moore, R.Y., Serotonin regulation of circadian rhythmicity. In: *The Neuropharmacology of Serotonin*, Ed. by Whitaker-Azmitia, P.M. and Peroutka, S.J., Annals of the New York Academy of Sciences, 1990, 600:418-426.

Holekamp, K.E., Simpson, B.H. and **Smale**, L., Endocrine influences on natal dispersal in beldings ground squirrels (*Spermophilus beldingi*). In: *Migration: Mechanisms and Adaptive Significance*, University of Texas press, Ed. Rankin, M.A., 1985.

3. Other

Smale, L and Nunez AA, Nocturnal/diurnal, Encyclopedia of Neuroscience, Springer.

Nunez AA and **Smale**, Seasonality, Encyclopedia of Neuroscience, Springer.

Smale, L, Book Review of: Life History and Social Strategies: from Development to Evolution, *Bioscience*, 2004, 54:462-463.

Holekamp, K.E. and **Smale**, L., A hostile homecoming, In: *The Smile of a Dolphin: Remarkable Accounts of Animal Emotions*, Ed: Bekoff, M, Discovery Books, NY., 2000 pp.119-121.

Smale, L., Book Review of: The Evolution of Sibling Rivalry, by D.M. Mock and G.A. Parker, *American Zoologist*, 1999, Volume 38, #6.

Smale, L, *Arvicanthis niloticus*: a diurnal “lab rat?,” *Biological Rhythms Bulletin*, Summer 1999, 1:9-11.

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Smale, L., Book Review of: Cheetahs of the Serengeti Plains: Group living in an asocial species, by T.M. Caro, *Animal Behavior*, 1996, 51:499-490.

Smale, L. and K.E. Holekamp, Growing up in the clan, *Natural History*, January 1993, p.42-53.

Smale, L. and Holekamp, K. E., The misunderstood spotted hyena, *Swara*, 1991 14: 10-13.

Invited Talks:

November, 2015, Brains of diurnal and nocturnal mammals: where are the differences?, Department of Biological Sciences at the University of Memphis,

August, 2015, Temporal niche transitions: From questions to data to speculation and back, European Biological Rhythms Society/WCC, University of Manchester, Great Britain

August, 2015, Temporal niche transitions, Primary Industries & Invasive Animal, Coffs Harbor, NSW, Australia.

January, 2014, Brain regions in control of diurnality, NeuroTime conference, Amsterdam, Netherlands.

November, 2013, Behavioral responses to light and darkness in nocturnal and diurnal rodents, Conference on “Understanding the neural basis of diurnality,” Strasbourg, France.

March, 2013, Proximate mechanisms and the evolutionary transition from a nocturnal to a diurnal niche, Arizona State University, Tuscon, AZ.

February, 2012, The transitions to diurnality: what happened to the brain? International workshop on “The diversity, evolution and mechanisms controlling activity patterns” in Ein-Getti, Israel.

October 2006, The diurnal brain, University of San Fransisco.

January, 2006, The neural substrates of diurnality, Winter Brain Conference.

June, 2003, Circadian organization of nocturnal vs. diurnal mammals, NIMH Workshop on: “Making sense of SCN heterogeneity: The tissue is the issue,” Washington DC.

May, 2002, The development of differences and similarities between the sexes in spotted hyenas (*Crocuta crocuta*), Instituto de Ecologia, UNAM (Mexico City).

March, 2002, Diurnal and nocturnal adaptations to the day-night cycle: how do the underlying neural mechanisms differ?, University of Alaska, Fairbanks.

March, 2000, Circadian rhythms in diurnal rodents, The Florida State University Rushton Symposium on Biological Clocks.

August, 1999, Neural correlates of a diurnal pattern of entrainment, International Congress of Chronobiology, Washington D.C.

March, 1997, NSF/CNRS sponsored conference, Lyons, France, Biological Rhythms: Physiological and molecular mechanisms.

January 1997, Within and between species variation in patterns of circadian rhythmicity, Winter Animal Behavior Conference.

May 1995, Circadian rhythms in diurnal mammals, Midwest Psychology Association, Chicago.

January 1995, Sibling rivalry in spotted hyenas, Winter Animal Behavior Conference.

November 1994, The development of sex differences in spotted hyenas, Society for Neuroscience conference.

April 1994, Aggressive behavior in female spotted hyenas: a multilevel perspective, Midwest Animal Behavior Society.

March 1994, The development of sex differences in spotted hyenas, University of Michigan, Biospsychology colloquium.

March 1992, Neural substrates of circadian rhythms of physiology and behavior, University of Wisconsin, Madison.

February 1991, Seasonal rhythms in prairie voles, Columbia University,

February 1991, Behavioral development in free-living spotted hyenas, University of Cincinnati.

February 1991, Circadian rhythms and their neural substrates, Princeton University.

February 1991, Behavioral development in free-living spotted hyenas, University of California, Santa Barbara.

March 1991, Association patterns and dominance in free-living spotted hyenas, University of California Berkeley.

November 1990, and November 1991, Behavioral development in free-living spotted hyenas, National Museums of Kenya.

Spring 1990, Rank acquisition in free-living spotted hyenas, "and Reproduction in free-living spotted hyenas, University of Michigan, Ann Arbor.

Spring 1990, Rank acquisition in free-living spotted hyenas, State University of New York, Stony Brook.

Spring 1989, Behavioral development in free-living spotted hyenas, University of Nairobi.

Spring 1989, Behavioral development in free-living spotted hyenas, University of California, Berkeley.

Research Experience:

Faculty research: August 1992-present, Circadian rhythms and biology of social behavior.

Research Associate: September 1988-August 1992, NSF-funded study of behavioral development in free-living spotted hyenas, conducted in Masai Mara National Reserve, Kenya, with Dr. K.E. Holekamp.

Postdoctoral research: January 1987-September 1988, State University of New York, Stony Brook, Neural substrates of circadian and seasonal rhythms, conducted in the labs of Dr. L.P. Morin and Dr. R.Y. Moore.

Graduate student research: June 1982-Jan. 1987, University of California, Berkeley, Hormonal influences on behavior, and environmental influences on hormones, conducted in the lab of Dr. I. Zucker.

Undergraduate field research: Summers of 1979 and 1981, Study of hormones, development and natal dispersal of Belding's ground squirrels.

Research Interests:

Neural substrates and evolution of circadian rhythms; mammalian reproduction and behavioral endocrinology; behavioral development; biology of social behavior.

Teaching Experience:

MSU Undergraduate classes: Psychobiology of the Lifespan; Brain and Behavior; Introductory Psychology; The Biology of Sleep and Rhythms, Evolution of a Social Brain; Developmental Psychobiology.

MSU Graduate student classes: Developmental Psychobiology (graduate and undergraduate); Neuroendocrine Aspects of Aggressive Behavior; Mating Systems and Social Behavior: Evolutionary and Neuroendocrine Perspectives; Evolution of a Social Brain.

Service:

Advisory Committee, MSU Program in Ecology, Evolutionary Biology and Behavior, 1998-present
NSF *ad-hoc* reviewer for panel on Neuroendocrine Systems, 1996-present
NSF *ad-hoc* reviewer for panel on Animal Behavior, 1995-present
NIMH *ad hoc* reviewer of Challenge Grants, 2013
Advisory Board, *Journal of Biological Rhythms*, 2001-2013
Co-organizer of international workshop on "The diversity, evolution and mechanisms controlling activity patterns" Ein-Gedi, Israel, 2012
NIMH grant review panel for sleep/rhythms research, 2005-2008
IACUC member 1999-2006
NIMH *ad hoc* reviewer for special program in Neuroscience Sleep and Circadian Biology, 2005
NIMH *ad hoc* reviewer for sleep/rhythms panel, 2003, 2004
DataBlitz Program Committee, Society for Neuroscience, 2003

Ad hoc reviewer for the following journals:

Acta Theriological
Animal Behavior
Behavioral Ecology and Sociobiology
Behavioral Neuroscience
Brain Research
Chronobiology International
Developmental Brain Research
Developmental Psychobiology
Endocrinology
European Journal of Neuroscience
Hormones and Behavior
Integrative and Comparative Biology
Journal of Biological Rhythms
Journal of Comparative Neurology
Journal of Experimental Zoology Part A (Ecological Genetics and Physiology)
Journal of Mammalogy
Neuroendocrinology
Neuroscience
Neurotoxicology
Physiological and Biochemical Zoology
Physiology and Behavior
PLoS 1
Proceedings of the National Academy of Sciences