

Kay E. Holekamp

Curriculum Vitae

PERSONAL

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EDUCATION

Ph.D. University of California (1983) Berkeley, California

A.B. (Cum Laude, with High Honors) (1973) Smith College, Northampton, Massachusetts

EMPLOYMENT

Professor, Department of Zoology, Michigan State University
East Lansing, Michigan (1999-present)

Associate Professor, Department of Zoology, Michigan State University
East Lansing, Michigan (1995-1999)

Assistant Professor, Department of Zoology, Michigan State University
East Lansing, Michigan (1992-1995)

Associate Curator of Mammals, Michigan State University Museum
East Lansing, Michigan (1993-Present)

Research Assistant Professor, Department of Psychology,
Michigan State University, East Lansing, Michigan (1991-1992)

Research Associate, Department of Ornithology and Mammalogy,
California Academy of Sciences, San Francisco, California (1987-1991)

N.R.S.A. Postdoctoral Fellow in the Department of Biology,
University of California, Santa Cruz, California (1983-86)

Supervisor of undergraduate research in Behavioral Ecology, Department of Biology,

University of California, Santa Cruz, California (1984-87)

Teaching Assistant, University of California, Berkeley, California (1977-81)

Research Assistant, University of California, Berkeley, California (1978-81)

Amazon River guide and interpreter, Parador Ticuna
Leticia, Amazonas, Colombia (1973-74)

Keeper, Small Mammal Division and Children's Zoo, St. Louis Zoo.
St. Louis, Missouri (1969, 1970, 1971, 1972)

AWARDS AND FELLOWSHIPS

NSF Grant IOS 0819437 (Organism-Environment Interactions) (2008-2013) "LTREB: Fitness consequences of pleiotropic androgen effects in free-living mammals." Principal Investigator: K.E. Holekamp; Co-PIs: Jeffrey A. French, Stephen E. Glickman and Kim T. Scribner.

NSF Grant IOS 0809914 (Neural Systems) (2008-2009) "SGER: Support of research involving captive spotted hyenas" Principal Investigator: Stephen E. Glickman; Co-PIs: Kay. E. Holekamp, Nancy G. Forger and Geert J. deVries.

Recipient of the College of Natural Science Distinguished Faculty Award, Michigan State University (2007)

Named University Distinguished Professor, Michigan State University (2006)

NSF Grant IOB 0618022 (Animal Behavior) (2006-2010) "Exploring the roles of competition and constraint in the evolution of mammalian behavior" Principal Investigator: K.E. Holekamp; Co-PIs: Barbara L. Lundrigan, Miriam Zelditch, and Kim T. Scribner.

Recipient of a Research Fellowship from the John Simon Guggenheim Memorial Foundation (2006).

Recipient of the C. Hart Merriam Award for outstanding research in mammalogy from the American Society of Mammalogists (2005)

IRGP award from the Office of the Vice President for Research and Graduate Studies at Michigan State University (2005-2006) "Frontal Cortex and Social Complexity: A Comparative Study using Computed Tomography." Principal Investigator: S. Sakai, CO-PIs: K.E. Holekamp & B.L. Lundrigan.

NSF Grant IBN 0343381 (Animal Behavior) (2004-2007) "Mammalian behavioral development under contrasting regimes of interspecific competition" Principal

Investigator: K.E. Holekamp; Co-PIs: L. Smale and J. A. French.

Elected as a Fellow of the Animal Behavior Society (2001)

College of Natural Science Outstanding Academic Advisor Award, Michigan State University (2001)

NSF Grant IBN 0113170 (LTREB: Animal Behavior) (2001-2006) "Integrated study of behavioral and morphological development in free-living carnivores" Principal Investigator: K.E. Holekamp; Co-PIs: Barbara L. Lundrigan and Kim T. Scribner.

NSF Grant IBN 9906445 (Animal Behavior) (1999-2003: current) "Mammalian sibling rivalry" Principal Investigator: K.E. Holekamp; Co-PIs: L. Smale, S. E. Glickman, and J. A. French.

International Studies Program, Michigan State University (1998): Development of new field course in Kenya entitled "The behavioral ecology of African mammals."

Teacher-Scholar Award, Michigan State University (1998)

Teacher-Scholar Award, College of Natural Science at Michigan State University (1997)

NSF Grant IBN 9630667 (Animal Behavior) (1996-2000) "The evolution of intelligence in response to social complexity." Principal Investigator: K.E. Holekamp; Co-PIs: L. Smale, and M. Zuk.

Searle Scholarship (1994-98).

David and Lucille Packard Fellowship for Science and Engineering (1993-1999).

NSF Grant IBN 9309805 (Animal Behavior) (1993) "Rank and reproduction in free-living spotted hyenas." Principal Investigator K.E. Holekamp, CO-PI: L. Smale.

NSF Grant BNS 9021461 (Animal Behavior) (1990) "Coalitions, dispersal, and mating in free-living spotted hyenas, *Crocuta crocuta*." Principal Investigator: K.E. Holekamp; Co-PIs: L. Smale, and L.G. Frank.

Charles A. Lindbergh Fund Grant (1989).

NSF Grant BNS 8706939 (Psychobiology) (1987) "Behavioral development in spotted hyenas, *Crocuta crocuta*." Principal Investigator: K.E. Holekamp; Co-PI: L.G. Frank.

National Research Service Award Postdoctoral Fellowship from the National Institutes of Health (1983)

Bache Fund Grant from the National Academy of Sciences (1982)

Grant from the Lerner-Gray Fund for Marine Research of the American Museum of Natural History (1982; declined)

Sigma Xi Grant-in aid-of-research (1979)

NSF Doctoral Dissertation Improvement Grant (BNS 80-20080) (1979)

American Association of University Women Graduate Fellowship (1979)

U. C. Chancellor's Patent Fund Research Grant (1979)

Phi Beta Kappa Scholarship (1978)

NSF Graduate Fellowship (1974)

PEER-REVIEWED PUBLICATIONS

Pangle, W. M & **Holekamp, K. E.** (In review) Lethal and non-lethal anthropogenic effects on spotted hyenas in the Masai Mara National Reserve. Conservation Biology.

Kolowski, J. M. & **Holekamp, K. E.** (In press) Ecological and anthropogenic influences on space use by spotted hyaenas (*Crocuta crocuta*). Journal of Zoology, London.

Watts, H. E., Blankenship, L. M., Dawes, S. E. & **Holekamp, K. E.** (In review) Responses of spotted hyaenas to lions reflect context-specific individual differences in behaviour. Ethology.

Van Horn, R.C., Watts, H. E. & **Holekamp, K. E.** (In press). Females may not choose mates based on tenure. Nature.

Pangle, W.M. & **Holekamp, K.E.** (In review) A comparative study of vigilance in East African carnivores. Behavioral Ecology and Sociobiology.

Lansing, S.W., Cooper, S. M., Boydston, E.E. & **Holekamp, K. E.** (In review) Taphonomic and zooarchaeological implications of spotted hyena (*Crocuta crocuta*) bone accumulations in Kenya: a modern behavioral ecological approach. Paleobiology.

Watts, H. E. & **Holekamp, K. E.** (In review) Ecological determinants of survival and reproduction in the spotted hyena. Journal of Mammalogy.

Smith, J. E., Kolowski, J. M., Graham, K. E., Dawes, S. E. & **Holekamp, K. E.** (2008) Social and ecological determinants of fission-fusion dynamics in the spotted hyaena. Animal Behaviour. In press

Watts, H. E. & **Holekamp, K. E.** (In press) Interspecific competition influences reproduction in spotted hyenas. Journal of Zoology, London.

Holekamp, K. E. & Dloniak, S. M. (2008) Maternal effects in fissiped carnivores. In Maternal Effects in Mammals. D. Maestriperi and J. Mateo (Eds.) University of Chicago Press, Chicago. In press.

Holekamp, K. E. & Engh, A. L. (2008) Reproductive skew in female-dominated mammalian societies. In Reproductive Skew in Vertebrates: Behavioural, Ecological, and Genetic Factors, R. Hager and C.B. Jones (Eds.) Cambridge University Press, Cambridge. In press.

Aureli, F, Schafner, C.M., Boesch, C., Bearder, S.K., Call, J., Chapman, C.A., Conner, R., Difiore, A., Dunbar, R. I. M., Henzi, S. P., **Holekamp, K. E.**, Korstjens, A. H., Layton, R.H., Lee, P., Leymann, J., Manson, J.H., Ramos-Fernandez, G., Strier, K.B., Van Schaik, C.P. (2008) Fission-Fusion Dynamics: New Research Frameworks. Current Anthropology. In press.

Kolowski, J. M. & **Holekamp, K. E.** (2008) Effects of an open refuse pit on space use patterns of spotted hyenas. African Journal of Ecology. In press.

Tanner, J. B., Dumont, E. R., Sakai, S. T., Lundrigan, B. L. & **Holekamp, K. E.** (2008) Of arcs and vaults: the biomechanics of bone-cracking in spotted hyenas (*Crocuta crocuta*). Biological Journal of the Linnean Society. In press.

Theis, K. R., Heckla, A. L., Verge, J. R. & **Holekamp, K. E.** (2008) The ontogeny of pasting behavior in free-living spotted hyenas, *Crocuta crocuta*. In: J. L. Hurst, R.J. Beynon, S.C. Roberts & T. D. Wyatt (Eds.), Chemical Signals in Vertebrates 11. Springer, New York. 179-188.

Van Meter, P. E., French, J. A., Bidali, K., Weldele, M. L., Brown, J. L., & **Holekamp, K. E.** (2008) Non-invasive measurement of fecal estrogens in the spotted hyena (*Crocuta crocuta*). General and Comparative Endocrinology. 155:464-471.

Tanner, J. B., Smale, L., & **Holekamp, K. E.** . (2007) Ontogenetic variation in the play behavior of spotted hyenas (*Crocuta crocuta*). Journal of Developmental Processes. 2: 5-30.

Wahaj, S. A., Place, N. J., Weldele, M. L., Glickman, S. E. & **Holekamp, K. E.** (2007) Siblicide in the spotted hyena: analysis with ultrasonic examination of wild and captive individuals. Behavioral Ecology. 18: 974-984.

Kolowski, J. M., Katan, D., Theis, K. R., & **Holekamp, K. E.** (2007) Daily patterns of activity in the spotted hyena. Journal of Mammalogy. 88: 1017-1028.

Holekamp, K. E., S. T. Sakai & Lundrigan, B. L. (2007) Social intelligence in the spotted hyena (*Crocuta crocuta*). In Social Intelligence: From Brain to Culture. N.J. Emery, N. S. Clayton, & C. Frith (Eds.) Oxford University Press. Oxford, UK. Pp 63-87.
Watts, H. E. & **Holekamp, K. E.** (2007) Hyena societies. Current Biology.17: R657-R660.

Szykman. M., Van Horn, R. C., Engh, A.L. Boydston, E. E. & **Holekamp, K. E.** (2007) Courtship and mating in free-living spotted hyenas. Behaviour. 144: 815-846.

Theis, K. R., Greene, K. M., Benson-Amram, S. R., & **Holekamp, K. E.** (2007). Sources of variation in the long-distance vocalizations of spotted hyenas. Behaviour.144: 557-584.

Holekamp, K. E., Sakai, S. T. & Lundrigan, B. L. (2007) The spotted hyena as a model system for study of the evolution of intelligence. Journal of Mammalogy. 88: 545-554.

Holekamp, K. E. (2007) Questioning the social intelligence hypothesis. Trends in Cognitive Science. 11: 65-69.

Holekamp, K. E., S. T. Sakai & Lundrigan, B. L. (2007) Social intelligence in the spotted hyena (*Crocuta crocuta*). Philosophical Transactions of the Royal Society B. 362:523-538.

Smith, J. E., Memenis, S. K. & **Holekamp, K. E.** (2007) Rank-related partner choice in the fission-fusion society of the spotted hyena (*Crocuta crocuta*) Behavioral Ecology and Sociobiology. 61: 753-765.

Dloniak, S.M., French, J. A. & **Holekamp, K. E.** (2006) Rank-related maternal effects of androgens on behaviour in wild spotted hyenas. Nature. 439: 1190-1193.

Boydston, E. E., Kapheim, K. M. & **Holekamp, K. E.** (2006) Patterns of den occupation by the spotted hyena (*Crocuta crocuta*). African Journal of Ecology. 44: 77-86.

Wahaj, S. A. & **Holekamp, K. E.** (2006) Functions of sibling aggression in the spotted hyena (*Crocuta crocuta*) Animal Behaviour. 71:1401-1409.

Nunes, S., Pelz, K. M., Muecke, E. M., Zucker, I. & **Holekamp, K. E.** (2006) Plasma glucocorticoid concentrations and body mass in ground squirrels: seasonal variation and circannual organization. General and Comparative Endocrinology. 146: 131-138.

Dloniak, S. M., French, J. A. & **Holekamp, K. E.** (2006) Faecal androgen levels in adult male spotted hyenas (*Crocuta crocuta*) reflect interactions with socially dominant females. Animal Behaviour. 71: 27-37.

Kolowski, J. M. & **Holekamp, K. E.** (2006) Spatial and temporal variation in livestock

depredation by large carnivores along a Kenyan reserve border. Biological Conservation. 128: 529-541.

Boydston, E. E., Kapheim, K. M., Van Horn, R. C., Smale, L. & **Holekamp, K. E.** (2005) Sexually dimorphic patterns of space use throughout ontogeny in the spotted hyaena (*Crocuta crocuta*). Journal of Zoology, London. 267: 271-281.

Engh, A. L., Siebert, E. R., Greenberg, D. A. & **Holekamp, K. E.** (2005) Patterns of alliance formation and post-conflict aggression indicate spotted hyaenas recognize third party relationships. Animal Behaviour. 69: 209-217.

Van Horn, R. C., Wahaj, S. A. & **Holekamp, K. E.** (2004). Role-reversed nepotistic interactions between sires and offspring in the spotted hyena. Ethology. 110: 1-14.

Wahaj, S.A, Van Horn, R. C., Van Horn, T., Dreyer, R., Hilgris, R., Schwarz, J. & **Holekamp, K. E.** (2004) Kin discrimination in the spotted hyena (*Crocuta crocuta*): Nepotism among siblings. Behavioral Ecology and Sociobiology. 56: 237-247.

Harrison, T.M., Mazet, J.K., **Holekamp, K. E.**, Dubovi, E., Engh, A.L., Nelson, K., Van Horn, R. C. & Munson, L. (2004) Antibodies to canine and feline viruses in spotted hyenas (*Crocuta crocuta*) in the Masai Mara National Reserve, Kenya. Journal of Wildlife Diseases. 40: 1-10.

Van Horn, R. C., Engh, A. L., Scribner, K. T., Funk, S. M. & **Holekamp, K. E.** (2004) Behavioral structuring of relatedness in the spotted hyena (*Crocuta crocuta*) suggests direct fitness benefits of clan-level cooperation. Molecular Ecology. 13: 449-458.

Dloniak, S. M., French, J. A., Place, N. J., Weldele, M. L., Glickman, S. E. & **Holekamp, K. E.** (2004) Non-invasive monitoring of fecal androgens in spotted hyenas (*Crocuta crocuta*). General and Comparative Endocrinology. 135: 51-61.

Holekamp, K. E. & Sisk, C. L. (2003) Effects of dispersal status on gonadal and pituitary function in the male spotted hyena. Hormones and Behavior. 44: 385-394.

Szykman, M., Engh, A. L., Van Horn, R. C., Scribner, K. T., Smale L. & **Holekamp, K. E.** (2003) Rare male aggression directed toward females in a female-dominated society: baiting behavior in the spotted hyena. Aggressive Behavior. 29: 457-474.

Boydston, E. E., Kapheim, K. M., Szykman, M. & **Holekamp, K. E.** (2003) Individual variation in space utilization by female spotted hyenas (*Crocuta crocuta*). Journal of Mammalogy. 84: 1006-1018.

Van Horn, R.C., McElhinny, T.L. & **Holekamp, K. E.** (2003) Age estimation and dispersal in the spotted hyena (*Crocuta crocuta*). Journal of Mammalogy. 84: 1019-1030.

Boydston, E. E., Kapheim, K. M., Watts, H. E., Szykman, M. & **Holekamp, K. E.** (2003) Altered behavior in spotted hyenas associated with increased human activity. Animal Conservation. 6: 207-219.

Wahaj, S. A. & **Holekamp, K. E.** (2003) Conflict resolution in the spotted hyena. In Animal Social Complexity. F. B. M. De Waa I & P. L. Tyack (eds). Harvard University Press. Pp. 249-253.

Engh, A. L. & **Holekamp, K. E.** (2003) Maternal rank 'inheritance' in the spotted hyena. In Animal Social Complexity. F. B. M. De Waal & P. L. Tyack (eds). Harvard University Press. Pp. 149-152.

Engh, A. L., Nelson, K. G., Peebles, C. R., Hernandez, A. D., Hubbard, K. K., & **Holekamp, K. E.** (2003). A coprological survey of the parasites of spotted hyaenas (*Crocuta crocuta*) in the Masai Mara National reserve, Kenya. Journal of Wildlife Diseases. 39: 224-227.

Place, N. J. **Holekamp, K. E.**, Sisk, C. L. Weldele, M. L. Coscia, E. M. Drea, C.M. & Glickman, S. E. (2002) Effects of prenatal treatment with anti-androgens on luteinizing hormone secretion and sex steroid concentrations in adult spotted hyenas, *Crocuta crocuta*. Biology of Reproduction 67: 1405-1413.

Nunes, S., Muecke, E. M. & **Holekamp, K. E.** (2002) Seasonal effects of food provisioning on body fat, insulin, and corticosterone in free-living juvenile Belding's ground squirrels (*Spermophilus beldingi*) Canadian Journal of Zoology. 80: 1-6.

Engh, A. L., Funk, S. M., Van Horn, R. C., Scribner, K. T., Bruford, M. W., Szykman, M., Smale, L. & **Holekamp, K. E.** (2002) Reproductive skew among males in a female-dominated society. Behavioral Ecology. 13: 193-200.

Holekamp, K. E. & Engh, A. L. (2002) Field studies of social cognition in spotted hyenas. In Bekoff, M., Allen, C., & Burghardt, G. M. (Eds) The Cognitive Animal: Empirical and Theoretical Perspectives on Animal Cognition. Oxford University Press. Pp 371-377.

Szykman M., Engh, A. L., Van Horn, R. C., Funk, S., Scribner, K. T. & **Holekamp, K. E.** (2001) Association patterns between male and female spotted hyenas reflect male mate choice. Behavioral Ecology and Sociobiology. 50: 231-238.

Wahaj, S. A., Guse, K. & **Holekamp, K. E.** (2001) Reconciliation in the spotted hyena (*Crocuta crocuta*). Ethology. 107: 1057-1074.

Boydston, E. E., Morelli, T. L. & **Holekamp, K. E.** (2001) Sex differences in territorial behavior exhibited by the spotted hyena (*Crocuta crocuta*). Ethology. 107:369-385.

Nunes, S., Muecke, E. M., Ross, H. E., Bartholomew, P. A. & **Holekamp, K. E.**

(2000) Food availability affects behavior but not circulating gonadal hormones in maternal Belding's ground squirrels. Physiology and Behavior 71:447-455.

Engh, A., Esch, K. Smale, L. & **Holekamp, K. E.** (2000). Mechanisms of maternal rank 'inheritance' in the spotted hyaena. Animal Behaviour. 60:323-332.

Holekamp, K.E. & Smale, L. (2000) Feisty females and meek males: reproductive strategies in the spotted hyena. In Reproduction in Context. K. Wallen and J. Schneider (Eds). MIT Press. Cambridge. MA. Pp. 257-285.

Holekamp, K. E., Boydston, E. E. & Smale, L. (2000) Group travel in social carnivores. In On the move: group travel in primates and other animals. S. Boinski and P. Garber (Eds.), University of Chicago Press, Chicago. Pp 587-627

Smale, L., **Holekamp, K. E.** & White, P. A. . (1999) Siblicide revisited in the spotted hyaena: does it conform to obligate or facultative models? Animal Behaviour. 58: 545-551.

Holekamp, K. E., Boydston, E. E., Szykman, M., Graham, I., Nutt, K., Birch, S., Piskiel, A. & Singh, M. (1999) Vocal recognition in the spotted hyaena and its possible implications regarding the evolution of intelligence. Animal Behaviour. 58:383-395.

Nunes, S. Duniec, T. R., Schweppe, S. A. & **Holekamp, K. E.** (1999) Energetic and endocrine mediation of natal dispersal behavior in Belding's ground squirrels. Hormones and Behavior. 35: 113-124.

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

Cooper, S. M. **Holekamp, K. E.** & Smale, L. (1999) A seasonal feast: long-term analysis of feeding behavior in the spotted hyaena, *Crocuta crocuta* (Erleben). African Journal of Ecology. 37: 149-160.

McElhinny, T. L., Sisk, C. L. **Holekamp, K. E.** & Smale, L. (1999) A morning surge in plasma LH coincides with elevated Fos expression in GnRH-IR neurons in the diurnal rodent *Arvicanthis niloticus*. Biology of Reproduction. 61: 1115-1122.

Holekamp, K. E. & Smale L. (1998a). Behavioral development in the spotted hyena. Bioscience. 48: 997-1005.

Holekamp, K. E. & Smale L. (1998b). Dispersal status influences hormones and behavior in the male spotted hyena. Hormones and Behavior. 33: 205-216.

Nunes, S., Ha, C. T., Garrett, P. J., Muecke, E. M., Smale, L. & **Holekamp K. E.**

(1998) Body fat and time of year interact to mediate dispersal behaviour in ground squirrels. Animal Behaviour. 55: 605-614.

McElhinny, T. L., Smale, L. & **Holekamp, K. E.** (1997) Patterns of body temperature, activity, and reproductive behavior in a tropical murid rodent, *Arvicanthis niloticus*. Physiology and Behavior. 62: 91-96.

Holekamp, K. E., Smale, L., Berg, R. & Cooper, S. M. (1997) Hunting rates and hunting success in the spotted hyaena. Journal of Zoology, London. **242**: 1-15.

Smale, L., Nunes, S. & **Holekamp, K. E.** (1997). Sexually dimorphic dispersal in mammals: patterns, causes, and consequences. In Advances in the Study of Behavior. P. J. B. Slater, J. S. Rosenblatt, M. Milinski, and C. T. Snowdon (eds). Academic Press. Volume 26, pp 181-250.

Holekamp, K. E., Cooper, S. M., Katona, C.I., Berry, N.A., Frank, L.G. & Smale L. (1997) Patterns of association among female spotted hyenas (*Crocuta crocuta*). Journal of Mammalogy. 78: 55-64.

Nunes, S., Zugger, P. A., Engh, A. L., Reinhart, K. O. & **Holekamp, K. E.** (1997) Why do female ground squirrels disperse away from food resources? Behavioral Ecology and Sociobiology. 40: 199-207.

Holekamp, K. E., Smale, L. & Szykman, M. (1996). Rank and reproduction in the female spotted hyaena. Journal of Reproduction and Fertility. 108:229-237.

Nunes, S. & **Holekamp, K. E.** (1996) Body mass and body fat influence the timing of natal dispersal in Belding's ground squirrels (*Spermophilus beldingi*). Journal of Mammalogy. 77: 807-817.

Alexander, K.A., Kat, P.W., Frank, L.G., **Holekamp, K. E.**, Smale, L., House, C. & Appell, M. J. G. (1995) Evidence of canine distemper virus infection among free-ranging spotted hyenas in the Masai Mara, Kenya. Journal of Zoo and Wildlife Medicine. 26: 201-206.

Frank, L. G., **Holekamp, K. E.** & Smale, L. (1995) Dominance, demography, and reproductive success of female spotted hyenas. In Serengeti II: Conservation, Research, and Management. A. R. E. Sinclair and P. Arcese (eds.). University of Chicago Press. Chicago. Pp 364-384.

Smale, L., **Holekamp, K. E.**, Weldele, M., Frank, L. G. & Glickman, S.E. (1995) Competition & cooperation between littermates in the spotted hyaena (*Crocuta crocuta*). Animal Behaviour. 50: 671-682.

Holekamp, K. E. & Smale L. (1995) Rapid change in offspring sex ratios after clan fission in the spotted hyena. The American Naturalist. 145: 261-278.

Alexander, K.A., Maclaughlin, N.J., Kat, P.W., House, C., O'Brien, S.J., Lerche, N.W., Sawyer, M., Frank, L.G., **Holekamp, K. E.**, Smale, L., McNutt, J.W., Laurenson, M.K., Mills, M.G.L. & Osburn B. I. (1994) Evidence of natural bluetongue virus infection among African and Indian carnivores. American Journal of Tropical Medicine and Hygiene. 51: 568-576.

Holekamp, K. E. & Smale L. (1993) Ontogeny of dominance in free-living spotted hyaenas: Juvenile rank relations with other immature individuals. Animal Behaviour. 46: 451-466.

Smale, L., Frank, L. G. & **Holekamp, K. E.** (1993) Ontogeny of dominance in free-living spotted hyaenas: Juvenile rank relations with adults. Animal Behaviour. 46: 467-477.

Holekamp, K. E., Ogutu, J., Frank, L. G., Dublin, H. T., & Smale, L. (1993) Fission of a spotted hyena clan: Consequences of female absenteeism and causes of female emigration. Ethology. 93: 285-299.

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

Holekamp, K. E. & Talamantes, F. (1992) Seasonal fluctuations in hormones and behavior of free-living male California ground squirrels (*Spermophilus beecheyi*). Hormones and Behavior. 26: 7-23.

Holekamp, K. E. & Talamantes, F. (1991) Seasonal variation in circulating testosterone and estrogens of wild-caught California ground squirrels (*Spermophilus beecheyi*). Journal of Reproduction and Fertility. 93: 415-425.

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

Holekamp, K. E. & Smale L. (1990) Provisioning and food-sharing by lactating spotted hyenas (*Crocuta crocuta*). Ethology. 86: 191-202.

Holekamp, K. E. & Sherman, P. W. (1989) Why male ground squirrels disperse. American Scientist. 77: 232-239.

Holekamp, K. E. & Nunes, S. (1989) Seasonal variation in body weight, fat, and behavior of free-living California ground squirrels (*Spermophilus beecheyi*). Canadian Journal of Zoology. 67: 1425-1433.

Holekamp, K. E., Nunes, S. & Talamantes, F. (1988) Patterns of progesterone

secretion in free-living California ground squirrels (*Spermophilus beecheyi*). Biology of Reproduction. 39: 1051-1059.

Holekamp, K. E., Nunes, S. & Talamantes, F. (1988) Circulating prolactin in free-living California ground squirrels (*Spermophilus beecheyi*). General and Comparative Endocrinology. 71: 484-492.

Colosi, P., **Holekamp, K. E.**, Thordarson, G., Southard, J. N., & Talamantes F. (1987) Purification and partial characterization of prolactin from the California ground squirrel (*Spermophilus beecheyi*). Biology of Reproduction. 36: 1017-1023.

Thordarson, G., **Holekamp, K. E.** & Talamantes, F. (1987) Development of an homologous radioimmunoassay for secreted prolactin from the California ground squirrel (*Spermophilus beecheyi*). Biology of Reproduction. 36:1186-1190.

Holekamp, K. E. (1986) Proximal causes of natal dispersal in Belding's ground squirrels (*Spermophilus beldingi*). Ecological Monographs. 56: 365-391.

Holekamp, K. E., Simpson, H. B. & Smale, L. (1985) Endocrine influences on natal dispersal in Belding's ground squirrels (*Spermophilus beldingi*). in Migration: Mechanisms and Adaptive Significance. M. A. Rankin (ed.) Contributions in Marine Sciences (Supplement). Vol. 27, Pp. 397-408.

Holekamp, K. E., Smale, L. Simpson, H. B. & Holekamp, N. A. (1984) Hormonal influences on natal dispersal in free-living Belding's ground squirrels (*Spermophilus beldingi*). Hormones and Behavior 18: 465-483.

Holekamp, K. E. (1984) Natal dispersal in Belding's ground squirrels (*Spermophilus beldingi*). Behavioral Ecology and Sociobiology. 16:21-30.

Holekamp, K. E. (1984) Dispersal in ground-dwelling sciurids. In The Biology of Ground-Dwelling Squirrels. J. O. Murie and G. R. Michener (eds.) University of Nebraska Press. Lincoln, Nebraska. Pp. 297-320

Holekamp, K. E. & Reutener, D. B. (1981) Observation, description, and analysis of the captive behavior of *Marmosa murina*. JSAS Cat. Sel. Doc. Psych. Vol 11. 69 pp.

OTHER PUBLICATIONS

Holekamp, K. E. & Kolowski, J. M. (In press) Hyaenidae. In *Handbook of Mammals of the World*. D. Wilson, R. Mittermeier & G. Fonseca (Eds.) Lynx Edicions, Madrid, Spain.

Holekamp, K. E. (2006) Spotted hyaenas. Current Biology. 16: R944-R945.

Holekamp, K. E. (2004) A view from the field: What the lives of wild animals can teach

us about care of laboratory animals. In The Development of Science-Based Guidelines for Laboratory Animal Care. Proceedings of the November 2003 International Workshop. Institute for Laboratory Animal Research. National Research Council. The National Academies Press. Washington, DC. Pp 169-174

Engh, A.L., & **K. E. Holekamp**. (2003) Uncovering the secret lives of hyenas. Annual Science Encyclopedia. World Book Publishing. Chicago. Pp 118-131.

Holekamp, K. E. & L. Smale (2000). A hostile homecoming. In The Smile of a Dolphin: Remarkable Accounts of Animal Emotions. M. Bekoff (ed.) Discovery Books (Random House). New York. Pp. 118-121.

Boydston, E. E. & **K. E. Holekamp** (2000) Applications of geographic information system (GIS) technology to hyena conservation. I.U.C.N. Hyaena Specialist Group Newsletter 7: 24-27.

Holekamp, K. E. (1997) Book review of Carnivore behavior ecology, and evolution: volume two, edited by J. L. Gittleman. Quarterly Review of Biology. 72: 212.

Holekamp, K. E. (1994) Book review of The Last Panda by George B. Schaller for The Quarterly Review of Biology. 69: 109-110.

Smale, L. & **K. E. Holekamp**. (1993) Growing up in the clan. Natural History. 102: 42-53.

Holekamp, K. E. & L. Smale. (1992) Hyaena-human relations in and around the Masai Mara National Reserve, Kenya. I.U.C.N. Hyaena Specialist Group Newsletter #5, Pp. 19-20. M.G.L. Mills (ed.). April, 1992.

Holekamp, K. E. (1991) Small mammals. In Fantastic Journeys. R. R. Baker (ed.) Weldon-Owen Publishers. Sydney, Australia. Pp 178-181.

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

Holekamp, K. E. (1983) Proximal mechanisms of natal dispersal in Belding's ground squirrels (Spermophilus beldingi). PhD Dissertation. University of California, Berkeley.

Holekamp, K. E. (1979) Suggestions for women travelers. In R. Berg's The Art & Adventure of Traveling Cheaply. And/Or Press. Berkeley CA. Pp 175-188.

HONORS

Invited speaker: Symposium on social inequity at the Santa Fe Institute, Santa Fe, NM. March 2008.

Keynote speaker: The C. Hart Merriam Award recipient. Annual meeting of the American Society of Mammalogists. Amherst, MA, June 2006.

Invited speaker: Symposium on social intelligence at the Royal Society, London, England, May 2006.

Keynote speaker: Research Symposium at the Center for Ecology, Evolution and Behavior. University of Kentucky, Lexington, KY. May, 2005.

Invited speaker: Symposium on fission-fusion societies at the International Society of Primatologists annual meeting in Torino, Italy, August 2004.

Invited speaker: The E.O. Wiley Lecture. Sam Houston State University, Huntsville, TX, March, 2004.

Invited speaker: The Dennis H. Chitty Lecture. University of British Columbia, Vancouver, BC. January, 2004.

Invited speaker: National Academy of Sciences conference on management of laboratory animals. Washington DC, November 2003.

Invited speaker: Graduate student selection for 2002 Distinguished Speaker in Ecology, Evolution & Behavior. University of Minnesota, Minneapolis (2002)

Invited speaker: Symposium on "The role of sex differences in health and disease." University of Massachusetts, Amherst (2002)

Invited plenary speaker: Congress of the Brazilian Ethological Society, Natal, Brazil (2002)

Invited speaker: Symposium on Non-genetical inheritance. International Ethology Congress, Tübingen, Germany (2001)

Invited speaker: World Ecology Day. Sponsored by the International Center for Tropical Ecology. St. Louis, MO (2000)

Invited speaker: Symposium on Parental investment. Midwest Animal Behavior Conference. Bowling Green, OH (1999)

Invited speaker: Special symposium: Contributions by outstanding women mammalogists. American Society of Mammalogists annual meeting, Blacksburg, VA (1998)

Invited speaker: Special symposium: Behavioral endocrinology in natural contexts. Society for Behavioral Neuroendocrinology annual meeting, Atlanta, GA (1998)

Michigan State University Teacher-Scholar Award, (1998)

College of Natural Science Teacher-Scholar Award, Michigan State University, (1997)

Invited speaker, St. Louis Zoological Society Guest Lecture Series. St Louis, MO (1996)

Invited Speaker, Workshop on Steroid Hormones and Brain Function Breckenridge, CO (1996)

Invited Speaker, Conference on Reproductive Behavior Twenty fifth anniversary celebration, East Lansing, MI (1993)

Invited Speaker, Animal Behavior Symposium Centennial Meeting, American Society of Zoologists, Boston, MA. (1989)

Recipient of Distinguished Teaching Award, University of California, Berkeley (1982)

Election to Phi Beta Kappa and Sigma Xi (1973)

INVITED LECTURES

2008: The Santa Fe Institute, Santa Fe, NM.

2008: Simon Fraser University, Vancouver, BC.

2008: The University of Michigan, Ann Arbor, MI

2007: Miami University, Oxford, OH

2007: University of Nebraska, Lincoln, NE

2007: University of Nebraska, Omaha, NE

2006: University of California, Davis, CA,

2006: University of California, Los Angeles, CA,

2006: Annual meeting of the American Society of Mammalogists, Amherst, MA.

2006: The Royal Society, London, U.K.

2006: University of California, Berkeley, CA. (2 talks at UCB in 2006 in Feb & Oct)

2005: Duke University, Durham, NC.

2005: University of Kentucky, Lexington, KY.

2005: Eastern Michigan University, Ypsilanti, MI.

2005: University of Miami, Miami, FL

2005: Potter Park Zoo, Lansing, MI.

2005: Western Michigan University. Kalamazoo, MI.

2004: University of California, Berkeley, CA.

2004: Utah State University, Logan, UT.

2004: Michigan State University EEBB Program, E. Lansing, MI.

2004: Smith College, Northampton, MA.

2004: Sam Houston State University, Huntsville, TX.

2004: University of British Columbia, Vancouver, BC.

2003: Indiana University, Bloomington, IN.
2003: National Academy of Sciences, Washington, DC.
2003: Emory University, Atlanta, GA.
2002: Brazilian Ethological Society, Natal, Brazil.
2002: University of Massachusetts, Amherst, MA.
2002: University of Minnesota, Minneapolis, MN.
2002: Central Michigan University, MI
2002: Oregon State University, Corvallis, OR.
2002: Humboldt State University, Arcata, CA.
2001: Purdue University, Lafayette, IN.
2001: International Ethology Congress, Tübingen, Germany.
2000: Zoological Society of San Diego, San Diego, CA.
2000: University of Missouri, St. Louis, MO.
2000: Lehigh University, Bethlehem, PA.
1999: Midwest Animal Behavior Society Meeting, Bowling Green, OH.
1998: Rutgers University, Newark, NJ.
1998: The Ohio State University, Columbus, OH.
1998: Texas A and M University, Galveston, TX.
1997: The Johns Hopkins University, Baltimore, MD.
1997: Winter Animal Behavior Conference. Jackson Hole, WY.
1996: St Louis Zoological Society, St Louis, MO.
1996: Conference on Steroid Hormones and Behavior, Breckenridge, CO.
1996: University of Toledo Medical School, Toledo, OH.
1995: Wayne State University, Detroit, MI.
1995: Winter Animal Behavior Conference. Jackson Hole, WY.
1995: University of Utah. Salt Lake City, UT.
1994: Cornell University. Ithaca, NY.
1994: Charles and Anne Morrow Lindbergh Foundation. Little Falls, MN.
1994: David and Lucille Packard Foundation. Monterey, CA.
1993: Conference on Reproductive Behavior. East Lansing, MI.
1993: University of Missouri. St. Louis, MO.
1992: East African Natural History Society, Nairobi, Kenya.
1992: University of Kansas. Lawrence, KS.
1992: University of Minnesota. Minneapolis, MN.
1992: University of Wisconsin. Madison, WI.
1991: State University of New York. Stony Brook, NY.
1991 and 1990: National Museums of Kenya. Nairobi, Kenya.
1989: University of Nairobi. Nairobi, Kenya.
1989: Centennial Meeting, American Society of Zoologists. Boston, MA.
1988: University of California. Berkeley, CA.
1986: University of California. Santa Cruz, CA.
1985: University of Nevada. Reno, NV.
1984: International Symposium on Migration: Mechanisms and Adaptive Significance.
Port Aransas Marine Laboratory, Port Aransas, TX..
1984: International Symposium on the Biology of Sciurid Rodents. Banff, Alberta,
Canada.

RESEARCH EXPERIENCE

2007-Present: Michigan State University, East Lansing (with L. Mansfield, P. Fraker & J. Tsao): Development of the spotted hyena as a new model of pathogen resistance.

2004-Present: Michigan State University, East Lansing (with S. Sakai & B. L. Lundrigan): Testing the 'social brain' hypothesis in carnivores using computed tomography.

2002-Present: Michigan State University, East Lansing (with L. Smale & J. A. French) Mammalian behavioral development under contrasting regimes of interspecific competition.

2001-Present: Michigan State University, East Lansing (with K. T. Scribner, B. L. Lundrigan & M. L. Zelditch) Integrated study of behavioral and morphological development in African carnivores.

1999-2004: Michigan State University, East Lansing (with L. Smale, S. E. Glickman, and J. French) Field Study of sibling rivalry in mammals.

1996-Present: Michigan State University, East Lansing (with L. Smale & A. L. Engh) Field Study of the evolution of intelligence in gregarious mammals.

1994-Present: Michigan State University, East Lansing (with S. Nunes & E. M. Muecke) Field study of physiological and energetic variables influencing the probability and timing of dispersal behavior in free-living Belding's ground squirrels (*Spermophilus beldingi*).

1994-1998: Michigan State University, East Lansing. (with C. Salsbury & T. McElhinny) A laboratory study of causes & consequences of dispersal in a diurnal, group-living rodent (*Arvicanthis niloticus*).

1993-1996. Michigan State University, East Lansing (with L. Smale) Field study of social and ecological influences on reproductive success in free-living spotted hyenas (*Crocuta crocuta*).

1991-1996. Michigan State University, East Lansing (with L. Smale) Field study of reproduction, dispersal patterns, and mating system in free-living spotted hyenas (*Crocuta crocuta*).

1988-1991. California Academy of Sciences, San Francisco (with L. Smale and L. G. Frank). Developmental study of rank acquisition and sexually dimorphic behavior in spotted hyenas (*Crocuta crocuta*).

1989-91. Charles A. Lindbergh Fund-supported study of the impact of tourist vehicles

Fall semester, 2002: ZOL313: Introduction to Animal Behavior
ZOL822: Graduate Seminar: Classic papers in Animal Behavior (co-taught with Heather Eisthen)

Summer semester, 2002: ZOL490 Behavioral Ecology of African Mammals.

Fall semester, 2001: ZOL313: Introduction to Animal Behavior

Fall semester, 2000: ZOL313: Introduction to Animal Behavior
ZOL822: Graduate Seminar in Animal Behavior (co-taught with Heather Eisthen)

Summer semester, 1999: ZOL490: The Behavioral Ecology of African Mammals.
(Co-taught with Barbara Lundrigan)

Fall semester, 1998: ZOL/LBS148H: Introductory Organismal Biology for Honors students.
ZOL489: The Biology of Mammalian Carnivores

Fall semester, 1997: ZOL/LBS148H: Introductory Organismal Biology for Honors students
ZOL822: Graduate Seminar in Animal Behavior

Fall semester, 1996: ZOL365: The Biology of Mammals
ZOL890: The Biology of Migratory Organisms

Fall semester, 1995: ZOL365: The Biology of Mammals
ZOL890: Behavioral Mechanisms in Evolutionary Ecology

Fall semester, 1994: ZOL365: The Biology of Mammals

Spring Semester, 1994: ZOL360: The Biology of Birds and Mammals (co-taught with Donald Beaver)

Fall Semester, 1993: ISB202: Ecology and Behavior: An Introductory Organismal Biology Course for Non-Majors.

Multiple guest lectures each year in courses offered in Zoology, Plant Biology, Fisheries and Wildlife, including field courses in Kenya.

COURSES TAUGHT ELSEWHERE

Fall semester, 2006: PSYCH 290. Integrated field & laboratory study in behavioral biology (a graduate seminar at UC Berkeley co-taught with Dr S. E. Glickman)

SERVICE

Reviewer for: *Nature*, *Journal of Mammalogy*, *Animal Behaviour*, *Behavioral Ecology*, *Acta Theriologica*, *Hormones and Behavior*, *Behavioral Ecology and Sociobiology*, *Proceedings of the Royal Society*, and *Physiological Zoology*.

Member, Scientific Advisory Committee for the MSU Museum, 2004-present.

Judge of student posters & oral presentations at the annual meeting of the American Society of Mammalogists, Springfield, MO. 2005.

Member, Animal Behavior Panel, IOB, National Science Foundation 2004 & 2007.

Associate Editor, *Animal Behaviour* 2001-2005.

Member, Animal Behavior Panel, IBN, National Science Foundation. 1997-2000.

Member, IUCN Hyaena Specialist Group. 1989-2006

Deputy chair, IUCN Hyaena Specialist Group. 2006- present.

Member, Mammal Endangered Species Technical Advisory Committee to the Michigan Department of Natural Resources. 1996-present.

Advisor for Honors College undergraduates majoring in Zoology, Michigan State University 1997-present.

Member 1996-99, Women's Advisory Council to the Provost, Michigan State University.

Co-chair, Women's Advisory Council to the Dean of the College of Natural Science Michigan State University. 1998-1999.

Director of Graduate Programs in Zoology, Michigan State University 1998-2006.

Service on multiple search committees for new faculty and staff, as well as numerous ad hoc committees within the Department of Zoology.

FORMER GRADUATE STUDENTS & POST-DOCS

C. Salsbury, Postdoc, PhD University of Kansas. Currently an Associate Professor of Biology at Butler University

S. M. Cooper, Postdoc, PhD University of Witwatersrand. Currently a Research Assistant Professor of Wildlife Biology at Texas A & M University

T. McElhinny, MS, 1996, Currently in PhD Program in Zoology at MSU

S. Nunes, BS University of California, PhD 1997, Currently an Associate Professor of Biology at the University of San Francisco, San Francisco, CA.

E. E. Boydston, BS Duke University, PhD 2001, Currently a Research Biologist for the US Geological Survey in Irvine, CA

M. Szykman, BS Amherst College, PhD 2001. Currently an Assistant Professor of Wildlife Biology at Humboldt State University, Arcata, CA.

A. L. Engh, BS Iowa State University, PhD 2002. Currently a post-doctoral fellow in Biology at the University of Pennsylvania, Philadelphia, PA.

K. Greene, MS 2002.

R. C. Van Horn, BS University of Minnesota, PhD 2003. Currently a Research Biologist at the Center for Reproduction of Endangered Species, San Diego, CA.

S. M. Dloniak, BS Northland College, PhD 2004. Currently Director of The Mara

Carnivore Conservation Project in Nairobi, Kenya

S. A. Wahaj, BS University of Florida, PhD 2004. Currently with Florida public schools.

E. M. Muecke, BS University of California, PhD 2005. Currently an Assistant Professor of Biology, Pacific University, Forest Grove, OR.

J. M. Kolowski, BS Cornell University, PhD 2007. Currently a post-doctoral research fellow, Smithsonian Institution, National Zoological Park Monitoring and Assessment of Biodiversity Program, Washington, DC.

H. E. Watts, BS Duke University, PhD 2007 (NSF fellow). Currently a post-doctoral fellow at the University of California, Davis, CA.

J. B. Tanner, BS University of Massachusetts, PhD 2007. Currently a visiting assistant professor at the University of Hawaii

CURRENT GRADUATE STUDENTS & POSTDOCS

A. P. Wagner, PhD 2005 Montana State University, Postdoc

K. R. Theis, BS State University of New York, PhD expected 2008

W. M. Trouilloud, BS McGill University, PhD expected 2008

P. E. Van Meter, BS Emory University, PhD expected 2008

S. LaCroix, BS University of Notre Dame, PhD expected 2009

S. R. Benson-Amram, BS Cornell University, PhD expected 2009

J. E. Smith, BS Colby College, PhD expected fall 2009 (UDF & PEO Scholar)

G. Stricker, BS Rutgers University, PhD expected 2010

K. Califf, BS University of Washington, PhD expected 2011 (CNS & NSF fellow)

K. C. Shaw, BS Amherst College, PhD expected 2011 (UDF & NSF fellow)

L. J. Curren, BS Amherst College, PhD expected 2011 (UDF)

A. S. Flies, BS Minnesota State University at Mankato, PhD expected 2011 (NSF fellow)

E. Swanson, BS University of Minnesota, PhD expected 2012, NSF fellow.

ACADEMIC MENTORS

PhD mentors: Stephen E. Glickman and Roy L. Caldwell,
University of California at Berkeley

Other members of PhD dissertation guidance committee: Frank A. Beach and David Wake

Postdoctoral mentor: Frank Talamantes, Department of Biology
University of California at Santa Cruz