RESEARCH STATEMENT
RICHARD R. LAWLER

BACKGROUND:

I am a biological anthropologist with expertise in behavioral ecology, population genetics, demography, and locomotor behavior. If I had to apply a single name to what I do, I would suggest "population biologist" in that I mostly tend to study a single evolving population rather than engage in comparative/interspecific studies. Broadly, I am interested in the ecological and behavioral processes that influence patterns of genetic and phenotypic variation in wild primate populations. In this regard, I tend to focus on population-level parameters (e.g., means/variances of trait values, selection coefficients, survival probabilities, etc.) rather than collect longitudinal behavioral data on specific individuals or social groups. My research incorporates *in situ* work in host countries, laboratory work, and computational methods. As I discuss below, I currently focus on a species of lemur as a model system; however, my research is not motivated by a taxon but by particular research questions that emanate from the major areas within evolutionary ecology: population genetics, behavioral ecology, demography, and evolutionary morphology.

I obtained a B.A. in Anthropology from the University of Illinois, Urbana-Champaign. Dr. Paul Garber was a major influence on my career and at Illinois I focused on general anthropology as well as primate socioecology. I then went on to get a M.A. in Anthropology at Southern Illinois University, Carbondale. I studied under Dr. Susan Ford and while at Carbondale I focused on primate systematics and evolution, primate anatomy, and primate locomotor behavior. From Carbondale, I went on to get a M.Phil. and Ph.D. from Yale University. I worked closely with Drs. David Watts, Alison Richard, and Margaret Riley. I spent much of my time as a member of the Riley Lab in the Department of Ecology and Evolutionary Biology. At Yale, I studied primate behavioral ecology, population genetics, and evolutionary theory. After receiving my Ph.D., I obtained a National Science Foundation Fellowship in Bioinformatics to study demography with Dr. Hal Caswell at the Woods Hole Oceanographic Institution.

I have conducted research on howling monkeys, titi monkeys and ring-tailed lemurs, but most of my research concerns a wild population of white sifaka (*Propithecus verreauxi*). This population resides at Beza Mahafaly Special Reserve, southwest Madagascar. The study site was set up by Drs. Alison Richard (Yale University) and Robert Sussman (Washington University) in collaboration with Malagasy scientists. I am part of research team that studies various behavioral, ecological, and evolutionary aspects of this evolving population. What is unique about this study, now going into its 35th year, is that our team is able to safely capture and release our study subjects—this is not the norm in wild primate studies. The data we collect on this population is ever-increasing and contains information on demography, morphology, ecology, reproduction, hormones, genetics, and behavior. These data come from individually marked-animals that are captured, measured and released on an annual basis; the marked animals are systematically recensused in order to provide information on survival, growth, inter-group movements, and reproduction. As of September 2022, we have captured, measured, marked and released over 1000 animals.

CURRENT RESEARCH AREAS (see my CV for full list of publications)**:**

Behavioral Ecology and Sexual Selection. I am interested in elucidating the behavioral and morphological factors that create variation in male reproductive success in primates. Substantively, I have found that sifaka males engage in a substantial amount of extra-group reproduction, which lowers the opportunity for sexual selection. Further, an analysis of paternity in conjunction with morphological data has shown that stabilizing selection plays a key role in male-male competition.

Parga JA, Sauther ML, Cuozzo FP, Ibrahim Antho Youssouf Jacky, Lawler RR, Sussman RW, Gould L, Pastorini J. (2016) Paternity in wild ring-tailed lemurs (*Lemur catta*): Implications for male mating strategies. American Journal of Primatology 78: 1316-1325

Lawler RR (2011) Feeding competition, cooperation, and the causes of primate sociality: A commentary on Sussman et al. American Journal of Primatology 73: 84-90

Lawler RR (2009) Monomorphism, male-male competition, and mechanism of sexual dimorphism. *J. Hum Evol.* 57: 321-325.

Lawler RR. (2007) Fitness and extra- group reproduction in male Verreaux's sifaka (*Propithecus verreauxi verreauxi*). American Journal of Physical Anthropology 132: 267-277

Lawler RR, Richard AF, Riley MA. (2005) Intrasexual selection in Verreaux's sifaka (*Propithecus verreauxi verreauxi*) . Journal of Human Evolution. 48: 259-277

Demography, Conservation, and Life History Evolution. I am a member of a long-term, community-based conservation program in southwest Madagascar. Our research team includes American, British, and Malagasy scientists who engage in both applied and theoretical research projects in and around our study site. On the theoretical side, I have become interested in demographic modeling, and in particular, the use of matrix population models. In 2009 we completed an extensive demographic analysis of sifaka population dynamics using information on females. I also use genetic and statistical techniques to evaluate the conservation status of wild primates.

Lawler RR (2018) Emerging and Enduring Issues in Primate Conservation Genetics. Annual Reviews of Anthropology 47: 395-415

Parga JA, Sauther ML, Cuozzo FP, Youssouf Jacky IA, Lawler RR (2012) Evaluating ring-tailed lemurs (*Lemur catta*) from southwestern Madagascar for a genetic population bottleneck. American Journal of Physical Anthropology 147: 21- 29

Linder JM, Lawler RR (2012) Model selection, zero-inflated models, and predictors of primate abundance in Cameroon. American Journal of Physical Anthropology 149: 417 -425.

Lawler RR (2011) Demographic concepts and research pertaining to the study of wild primate populations. Yearbook of Physical Anthropology 54: 63-85.

Lawler RR (2010) Historical demography of a wild lemur population (*Propithecus verreauxi*) in southwest Madagascar. Population Ecology.

Lawler RR, Richard AF, Dewar RE, Schwartz M, Ratsirarson J, Caswell H. (2009) Demography of a wild lemur population stochastic rainfall environment. Oecologia 161: 491-504.

Lawler RR. (2008) Testing for a historical population bottleneck in wild Verreaux's sifaka (*Propithecus verreauxi verreauxi*) using microsatellite data. American Journal of Primatology. 70: 990-994.

Genomics, Population Genetics, and Quantitative Genetics. I am interested in how behavioral patterns influence the genetic structure of primate populations and vice versa. My substantive research in this area involves looking at how patterns of mating and dispersal shape genetic variation within and among social groups in terms of their influence on genetic structure and effective population size. I am also interested in quantitative genetics, particularly as it concerns the estimation of selection, heritability, additive genetic correlations, and maternal/cohort effects. Additional projects include epigenetic clocks, genetic basis of color-vision, and population genetics of ring-tail lemurs.

Guevara EE, Lawler RR (2018) Epigenetic Clocks. Evolutionary Anthropology. https://doi.org/10.1002/evan.21745

Jacobs RL, MacFie TS, Spriggs A, Baden AL, Morelli TL, Irwin MT, Lawler RR, Kappeler PM, Wright PC, Louis Jr. EE, Mundy NI, Bradley BJ. (2017). Novel and highly polymorphic vision in the diurnal, largest-bodied lemurs. Biology Letters 13: 20170050

Parga JA, Sauther ML, Cuozzo FP, Ibrahim Antho Youssouf Jacky, Gould L, Sussman RW, Lawler RR, Pastorini J. (2015). Genetic evidence for male and female dispersal in wild *Lemur catta*. Folia Primatologica. 1-2: 66-75

Bradley BJ, Lawler RR (2011) Linking genotypes, phenotypes and fitness in wild primate populations. Evolutionary Anthropology 20: 104-119

DiFiore T, Lawler RR, Gagneaux P (2011) Molecular primatology. In: CJ Campbell, A Fuentes, KC MacKinnon, M Panger, SK Bearder (eds.) Primates in Perspective (2/e) Oxford University Press, Oxford.

Lawler RR, Blomquist GE (2010) Multivariate selection theory in primatology: An introduction to the concepts and literature. The Open Anthropology Journal. 3: 206-229

Lawler RR, Richard AF, Riley MA. (2003) Genetic population structure of the white sifaka (*Propithecus verreauxi verreauxi*) in southwest Madagascar. Molecular Ecology 12: 2307-2317.

Lawler RR, Richard AF, Riley MA. (2001) Isolation and screening of microsatellite loci in a wild lemur population (*Propithecus verreauxi verreauxi*). American Journal of Primatology. 55: 253-259.

Primate Locomotion and Evolutionary Morphology. I maintain an interest in the study of primate movement in the wild. In particular, I am interested in how young sifaka develop locomotor coordination. Sifaka move about their habitat by leaping between vertical tree trunks—this behavior entails a fair amount of coordination and poses a challenge for newly locomotor- independent sifaka. I have studied this problem from various angles including behavioral sampling of movement in the wild, analysis of growth patterns of limbs, and population genetic methods, such as calculating the heritability and strength of selection that acts on hand, feet, and other body parts that contribute to movement. Our recent project, funded by the Leakey Foundation, involves the instrumentation of individual animals with accelerometers to measure energy expenditure during movements. I have also studied locomotion and prehensile tail use in South American primates.

Wunderlich RE, Lawler RR, Williams AE. (2011) Field and experimental approaches to the study of locomotor ontogeny in *Propithecus verreauxi*. In: D'Aout, K. and Vereecke, E.E. (eds) Studying Primate Locomotion: Linking in situ and ex situ Research. New York, Springer. p135-154

Lawler RR. (2008) Morphological integration and natural selection in a wild lemur population. American Journal of Physical Anthropology 136: 203 -214

Lawler RR. (2006) Sifaka positional behavior: Ontogenetic and quantitative genetic approaches. American Journal of Physical Anthropology. 131:261-271

Lawler RR, Ford SM, Wright PC, Easley SP. (2006) Locomotor behavior of *Callicebus brunneus* and *Callicebus torquatus*. Folia Primatologica. 77:228-239

Lawler RR, Stamps C. (2002) The relationship between tail use and positional behavior in *Alouatta palliata* . Primates. 42:147-152
Lawler RR, Wunderlich RE, Rolian C (in prep.) Ontogenetic and functional covariance structure of postcranial traits in Verreaux's sifaka.
Heslep N, Lawler RR, Raharinoro NA, Wunderlich RE (2023) Locomotor energetics and development in wild Verreaux's sifaka (*Propithecus verreauxi*) Poster Presentation, Austin TX, USA.
Wunderlich RE, Heslep N, Rahorinoro NA, Niculescu N, Lawler RR (2023) Factors influencing locomotion and mechanical energetics in growing wild sifaka (*Propithecus verreauxi*). American Journal of Biological Anthropology. 75:

Comparative studies of life history and demography. As of 2017, I joined the researchers, notably Dr. Karen Strier and Dr. Susan Alberts, who founded the Primate Life History Database. The data that comprise this database contain standardized information on the reproductive careers and survival of individual primates. The species represented are white sifaka, white-faced capuchins, muriquis, blue monkeys, savanna baboons, mountain gorillas, and common chimpanzees.

Zipple MN, Altmann J, Campos FA, Cords M, Fedigan LM, Lawler RR, Lonsdorf EV, Perry S, Pusey AE, Stoinski TS, Strier KB, Alberts SC. Beyond orphaned infants: Novel effects of maternal death in wild primates (2021) Proceedings of the National Academy of Sciences, USA. 118: e2015317118, https://doi.org/10.1073/pnas.2015317118
Colchero F, Aburto JM, Archie EA, Boesch C, Breuer T, Campos FA, Collins A, Conde DA, Cords M, Crockford C, Emery Thompson M, Fedigan LM, Fichtel C, Groenenberg M, Hobaiter C, Kappeler PM, Lawler RR, Lewis RJ, Machanda Z, Manguette ML, Muller MN, Packer C, Parnell RJ, Perry S, Pusey AE, Robbins MM, Seyfarth R, Silk JB, Staerk J, Stoinski TS, Stokes EJ, Strier KB, Strum SC, Tung J, Wittig RM, Wrangham R, Vaupel JW, Zuberbuler K, Alberts SC (2021) The evolutionary landscape of primate longevity. Nature Communications. 12: 3666 p.1-10.
Campos FA, Altmann J, Cords M, Fedigan LM, Lawler RR, Lonsdorf EV, Stoinski TS, Strier KB, Bronikowski AM, Pusey AE, Alberts SC. (2022) Female reproductive aging in seven primate species: Patterns and consequences. Proceedings of the National Academy of Sciences, USA. Vol. 119 No. 20 e2117669119

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