

RACHEL L. JACOBS

U.S. Fish & Wildlife Service
National Fish & Wildlife Forensics Laboratory
1490 East Main Street
Ashland, OR 97520

Email: rachel_jacobs@fws.gov

Personal website: <http://rachellynjacobs.weebly.com/>

EDUCATION

2015 Ph.D., Anthropology, Stony Brook University
2009 M.A., Anthropology, Stony Brook University
2004 B.A., Anthropology, Indiana University at Bloomington
2004 Area Certificate, Animal Behavior, Indiana University at Bloomington

PROFESSIONAL APPOINTMENTS

2017 – present **Forensic Scientist – Morphology**, National Fish & Wildlife Forensics Laboratory, U.S. Fish & Wildlife Service
2015 – 2017 Post-doctoral Scientist, Primate Genomics Lab, Center for the Advanced Study of Human Paleobiology, Department of Anthropology, The George Washington University

PEER-REVIEWED PUBLICATIONS (*indicates student co-author)

Jacobs RL, MacFie TS, Spriggs AN*, Baden AL, Morelli TL, Irwin MT, Lawler RR, Pastorini J, Mayor M, Lei R, Culligan R, Hawkins MTR, Kappeler PM, Wright PC, Louis EE, Mundy NI, Bradley BJ. 2017 Novel opsin gene variation in large-bodied, diurnal lemurs. *Biology Letters* DOI: 10.1098/rsbl.2017.0050

Crouse D*[†], **Jacobs RL**[†], Richardson Z*, Klum S, Jain A, Baden AL, Tecot SR. 2017 LemurFaceID: a face recognition system to facilitate individual identification of lemurs. *BMC Zoology*. DOI: 10.1186/s40850-016-001

[†]indicates shared first-authorship.

Jacobs RL, Spriggs AN*, Baden AL, Irwin MT, Wright PC, Louis EE, Lawler RR, Bradley BJ. 2016 Primate genotyping via High Resolution Melt Analysis (HRMA): Rapid and reliable identification of color vision status in wild lemurs. *Primates* 57, 541-547.

Jacobs RL, Bradley BJ. 2016 Considering the influence of nonadaptive evolution on primate color vision. *PLoS ONE* 11, e0149664. DOI: 10.1371/journal.pone.0149664

Goodenberger KE, Boyer DM, Orr CM, **Jacobs RL**, Femiani JC, Patel BA. 2015 Functional morphology of the hallucal metatarsal with implications for inferring grasping ability in extinct primates. *American Journal of Physical Anthropology* 156, 327-348.

Veilleux CC, **Jacobs RL**, Cummings ME, Louis EE, Bolnick DA. 2014 Opsin genes and visual ecology in a nocturnal folivorous lemur. *International Journal of Primatology* 35, 88-107.

Grine FE, **Jacobs RL**, Reed KE, Plavcan JM. 2012 The enigmatic molar from Gondolin, South Africa: Implications for *Paranthropus* paleobiology. *Journal of Human Evolution* 63, 597-609.

Patel BA, Seiffert ER, Boyer DM, **Jacobs RL**, St Clair EM, Simons EL. 2012 New primate first metatarsals from the Paleogene of Egypt and the origin of the anthropoid big toe. *Journal of Human Evolution* 63, 99-120.

Jacobs RL, Boyer DM, Patel BA. 2009 Comparative functional morphology of the primate peroneal process. *Journal of Human Evolution* 57, 721-731.

Wright PC, Johnson SE, Irwin MT, **Jacobs R**, Schlichting P, Lehman S, Louis EE, Arrigo-Nelson SJ, Raharison J-L, Rafalirarison RR, Razafindratsita V, Ratsimbazafy J, Ratelolahy FJ, Dolch R, Tan C. 2008 The crisis of the critically endangered greater bamboo lemur (*Prolemur simus*). *Primate Conservation* 23, 5-17.

PUBLICATIONS IN ACTIVE PREPARATION (*indicates student co-author)

Jacobs RL, Veilleux CC, Melin AD. Dichromatic color vision may be adaptive for food foraging in red-bellied lemurs (*Eulemur rubriventer*).

Jacobs RL, MacFie TS, Kamilar JM, Spriggs AN*, Morelli TL, Baden AL, Lawler RR, Irwin MT, Pastorini J, Sauther ML, Mayor M, Lei R, Culligan R, Hawkins MTR, Kappeler PM, Wright PC, Louis EE, Mundy NI, Bradley BJ. Variable color vision in wild lemurs indicates local adaptation.

Jacobs RL, Frankel DC*, Rice RJ*, Bradley BJ. Parentage complexity in socially monogamous wild lemurs (*Eulemur rubriventer*).

PROFESSIONAL ABSTRACTS & REVIEWS (*indicates student co-author)

Guevara EE, Chen-Kraus C, **Jacobs RL**, Baden AL. 2017 Celebrating fifty years of research at the Duke Lemur Center. *Evolutionary Anthropology* 26, 47-48.

Jacobs RL, MacFie TS, Kamilar JM, Spriggs AN*, Baden AL, Morelli TL, Irwin MT, Lawler RR, Pastorini J, Mayor M, Sauther ML, Lei R, Culligan R, Hawkins MTR, Kappeler PM, Wright PC, Louis EE, Mundy NI, Bradley BJ. 2017 Variation in lemur color vision across species, populations and habitats: Implications for signal evolution. *American Journal of Physical Anthropology* 162:S64, 229.

Frankel DF*, **Jacobs RL**, Louis EE, Hopkins WD, Bradley BJ. 2017 Rapid, inexpensive genotyping and barcoding of primates: multiple applications for high-resolution melt analysis in primatology and anthropology. *American Journal of Physical Anthropology* 162:S64, 185-185.

Jacobs RL, MacFie TS, Spriggs AN*, Baden, AL, Morelli TL, Irwin MT, Lawler RR, Pastorini J, Mayor M, Lei R, Culligan R, Hawkins MTR, Kappeler PM, Wright PC, Louis EE, Mundy NI, Bradley BJ. 2016 Novel and highly polymorphic color vision in wild indriids. Northeastern Evolutionary Primatologists meeting, New York, NY.

Jacobs RL, MacFie TS, Spriggs AN*, Baden, AL, Morelli TL, Irwin MT, Lawler RR, Pastorini J, Mayor M, Lei R, Culligan R, Hawkins MTR, Kappeler PM, Wright PC, Louis EE, Mundy NI, Bradley BJ. 2016 Color vision in wild indriids shows novel variation among lemurs. Joint meeting of the International Primatological Society and the American Society of Primatologists.

Vagell R*, Vagell VJ, Tepper SJ, Avery IM, **Jacobs RL**, Gordon J, Baden AL. 2016 Novel skill acquisition in ruffed lemurs (*Varecia* spp.): Preliminary data from SMARTA color vision study at Duke Lemur Center. Joint meeting of the International Primatological Society and the American Society of Primatologists.

Jacobs RL, Veilleux CC, Melin AD. 2016 Dichromacy as an adaptation for foraging in red-bellied lemurs (*Eulemur rubriventer*). *American Journal of Physical Anthropology* 159:S62, 183.

Frankel DC*, **Jacobs RL**, Rice RJ*, Bradley BJ. 2016 Parentage complexity in socially monogamous wild lemurs (*Eulemur rubriventer*). *American Journal of Physical Anthropology* 159:S62, 147.

Jacobs RL, Bradley BJ. 2015 The potential role of nonadaptive evolutionary mechanisms shaping color vision in red-bellied lemurs (*Eulemur rubriventer*). *American Journal of Physical Anthropology* 156:S60, 176.

Perlman RF, **Jacobs RL**, Pain EL. 2014 Inaugural meeting of the Northeastern Evolutionary Primatologists group. *Evolutionary Anthropology* 23, 207-208.

Jacobs RL, Tecot SR, Klum S, Crouse D, Jain AK. 2014 Face recognition technology for individual identification of lemurs. Northeastern Evolutionary Primatologists meeting, Rutgers, NJ.

Jacobs RL, Tecot SR, Klum S, Jain AK. 2014 Developing novel face recognition techniques for population assessments and long-term research of threatened lemurs. International Primatological Society XXV Congress, Hanoi, Vietnam.

Tecot SR, **Jacobs RL**, Baden AL, Erhart E. 2014 Reproductive physiology and behaviour in *Eulemur*. International Primatological Society XXV Congress, Hanoi, Vietnam.

Wright PC, Baden AL, **Jacobs R**, Larney E, Karpanty S, Tecot S, Herrera J, Karanewsky C, Zohdy S, Razafindratsima O. 2014 Long term research stations compound scientific value: Centre ValBio, Ranomafana National Park, Madagascar. *American Journal of Physical Anthropology* 153:S58, 277-278.

Baden AL, Maiolino S, Holowka N, **Jacobs RL**. 2011 Eightieth annual meeting of the American Association of Physical Anthropologists. *Evolutionary Anthropology* 20, 123-125.

Jacobs RL, Baden AL, Rabemaharavonirina RN, Bradley BJ. 2011 Variation in foraging behavior and color vision status in wild female black-and-white ruffed lemurs. *American Journal of Physical Anthropology* 144:S52, 174-175.

Chester SGB, Boyer DM, Bloch JI, Sargis EJ, **Jacobs RL**, Patel BA. 2010 Hallucal metatarsal of euarchontan mammals. *American Journal of Physical Anthropology* 141:S50, 80.

Patel BA, Boyer DM, **Jacobs RL**, Seiffert ER, Simons EL. 2010 Anthropoid first metatarsal from the late Eocene of Egypt. *American Journal of Physical Anthropology* 141:S50, 186.

Jacobs RL, Patel BA, Boyer DM. 2008 Does a large peroneal process on the first metatarsal reflect leaping behavior in prosimian primates? *American Journal of Physical Anthropology* 135:S46, 124.

Coleman MK, Baden AL, **Jacobs R**, Patel BA. 2007 From hobbits to giants: Blue skies prevail in stormy Philadelphia. *Evolutionary Anthropology* 16, 123-125.

ORGANIZED MEETINGS & SYMPOSIA

Baden AL, **Jacobs RL**, Petersdorf M, Borries C, Koenig A. 2016 Second Meeting of the Northeastern Evolutionary Primatology group (NEEP). Hunter College.

Veilleux CC, Garrett EC, **Jacobs RL**. 2011 Ears, Eyes, and Noses: Revisiting the Evolution and Ecology of the Primate Special Senses, invited poster symposium at the 80th annual meeting of the American Association of Physical Anthropologists.

NON-ACADEMIC PUBLICATIONS

Jacobs R, Krause D. 2011 *Discover the Dinosaurs of Madagascar Coloring Book*. Illustrated by Luci Betti-Nash. Privately printed. Stony Brook University, Stony Brook, NY.

GRANTS & AWARDS

- 2014 Student Award for Outstanding Poster Presentation, Honorable Mention: International Primatological Society XXV Congress, Hanoi, Vietnam
- 2013 Idea Wild (equipment grant \$1,333): The Ranomafana Red-Bellied Lemur Project: Population assessment of a threatened species on the decline (collaborative grant with Dr. Stacey Tecot, University of Arizona)
- 2012 The National Science Foundation (\$24,384): Doctoral Dissertation Improvement: The effects of light level and color vision on the foraging behavior of cathemeral red-bellied lemurs (*Eulemur rubriventer*)
- 2011 The Wenner-Gren Foundation (\$19,732): Foraging under low light levels and the evolution of primate color vision
- 2011 The Leakey Foundation (\$13,497): Low light foraging and trichromatic color vision in Malagasy lemurs
- 2011 RW Primate Fund (\$1,980): The effects of light level and color vision on the foraging behavior of red-bellied lemurs (*Eulemur rubriventer*): Phase 1, population assessment
- 2010 RW Primate Fund (\$2,452): The effects of light level and color vision on the foraging behavior of red-bellied lemurs (*Eulemur rubriventer*): Phase 1, population assessment
- 2008 IDPAS Research Grant (\$500): The role of color in fruit detection and selection in the black-and-white ruffed lemur (*Varecia variegata*)
- 2007 Saint Louis Zoo Field Conservation Grant (\$9,840): The crisis of the greater bamboo lemur: Resurveying *Prolemur simus* sites to determine population numbers of a critically endangered Malagasy primate
- 2007 Conservation International, Primate Action Fund (\$4,700): The crisis of the greater bamboo lemur: Resurveying *Prolemur simus* sites in Madagascar to determine population numbers of a critically endangered primate
- 2007 Primate Conservation, Inc. Research Grant (\$4,800): Assessment of the densities of *Prolemur simus* and giant bamboo at five sites in southeastern Madagascar
- 2006-2008 Presidential Fellowship: Interdepartmental Doctoral Program in Anthropological Sciences, Stony Brook University

RESEARCH EXPERIENCE

Molecular Research (Post-doctoral Scientist)

Primate Genomics Lab, The George Washington University (9/2015 – present)

Current projects: lemur opsin genes and color vision evolution; high resolution melting analysis for characterizing color vision in wild primates and identifying primate species; population genetics of red-bellied lemurs; genetic variation and evolution of primate pelage coloration

Molecular Research (Principal Investigator)

Sensory ecology and population genetics of wild lemurs (2010 – 2015): Yale Molecular Anthropology Laboratory, Yale University

Data collection: opsin gene and microsatellite variation

Professional skills: Laboratory methods – DNA extraction from fecal material, amplification (PCR), quantification (qPCR), sex-genotyping, gel electrophoresis, high resolution melting analysis for SNP genotyping, sequencing (Sanger), microsatellite genotyping; Population genetics software – CERVUS, FSTAT, Genepop, GenAEx, BOTTLENECK, STRUCTURE; Microsatellite analysis software – GeneMapper, GeneMarker; DNA and protein sequence analysis software – ClustalX, FinchTV, Geneious

Field Research (Principal Investigator)

Foraging behavior and sensory ecology of red-bellied lemurs (2011 – 2013):

Ranomafana National Park, Madagascar

Data collection: Fecal samples for genetic analysis, systematic behavioral observation of foraging behavior, spectral data of plant material

Professional skills: Field methods – Focal animal sampling, primate survey, spectral data collection using USB 2000+UV-VIS spectrometer and SpectraSuite software; Data analysis – MATLAB, R, SPSS

Foraging behavior of red-bellied lemurs (2009): Ranomafana National Park, Madagascar

Data collection: Systematic behavioral observation of foraging behavior

Professional skills: Field methods – Focal animal sampling

Foraging behavior of black-and-white ruffed lemurs (2008): Ranomafana National Park, Madagascar

Data collection: Systematic behavioral observation of foraging behavior

Professional skills: Field methods – Focal animal sampling

Population surveys of critically endangered greater bamboo lemurs (2007):

Southeastern Madagascar

Data collection: Species presence/absence, bamboo densities

Professional skills: Field methods – Primate survey (line-transects, sweep sampling), botanical plot sampling

Field Research (Research Assistant)

Orangutan population surveys (2005): Kawasan Konservasi Sungai Lesan, East Kalimantan, Indonesia.

Data collection: Primate population densities

Professional skills: Field methods – Primate survey (line-transects)

Principal Investigator: Dr. Roberto Delgado

Vertebrate fossil collection (2004): Big Horn Basin, Wyoming

Data collection & professional skills: Field methods - Fossil surface collection

Principal Investigator: Randy Patrick

TEACHING EXPERIENCE

Instructor

- 2014 Controversies in Human Biology and Behavior, Department of Anthropology, Stony Brook University
- 2012 Introduction to Physical Anthropology Lab Section, Department of Anthropology, Stony Brook University
- 2009 Introduction to Physical Anthropology Lab Section, Department of Anthropology, Stony Brook University

Teaching Assistant

- 2015 Introduction to Archaeology, Department of Anthropology, Stony Brook University
- 2013 Controversies in Human Biology and Behavior, Department of Anthropology, Stony Brook University
- 2012 Introduction to Physical Anthropology, Department of Anthropology, Stony Brook University
- 2011 Male and Female, Department of Anthropology, Stony Brook University
- 2010 Science and Technology in Ancient Societies, Department of Anthropology, Stony Brook University
- 2009 Stony Brook Study Abroad Madagascar: Primate Behavior and Ecology, Ecosystem Diversity and Evolution, Field Methods in Primatology and Field Biology, Independent Study: Research in Biology or Anthropology, Department of Anthropology, Stony Brook University
- 2009 Introduction to Physical Anthropology, Department of Anthropology, Stony Brook University
- 2008 La Suerte Biological Field Station in Costa Rica: Primate Behavior and Ecology

Invited Lectures

- 2016 “Lemur diversity past and present” for *Extinction*, Rutgers University
- 2016 “Genetics of primate populations” for *Human Evolutionary Genetics*, The George Washington University
- 2016 “Color vision evolution in lemurs” for CASHP Journal Club, The George Washington University

- 2014 “Individual identification” and “Molecular methods in primatology” for *Methods in Biological Anthropology (Primate)*, University of Arizona
- 2012 “Primate color vision”, “Individual identification”, and “Project design” for Stony Brook Study Abroad Madagascar
- 2011 “Primate sensory ecology” and “Individual identification” for Stony Brook Study Abroad Madagascar

OTHER RELEVANT EMPLOYMENT & EXPERIENCE

Graduate/Research Assistant

- 2014 Department of Anthropology, Stony Brook University
Responsibilities: Developed materials for new Human Evolutionary Biology major at Stony Brook University, database management
Supervisor: Dr. Andreas Koenig
- 2010 – 2011 Department of Anatomical Sciences, Stony Brook University
Responsibilities: Curation of fossil vertebrates from the Cretaceous of northwestern Madagascar
Supervisor: Dr. David Krause
- 2008 – 2009 Department of Anatomical Sciences, Stony Brook University
Responsibilities: Curation of fossil vertebrates from the Cretaceous of northwestern Madagascar
Supervisor: Dr. David Krause
- 2007 Department of Anatomical Sciences, Stony Brook University
Responsibilities: Data collection on modern human foot morphometrics for ongoing studies on *Homo floresiensis*
Supervisor: Dr. William Jungers
- 2006 – 2007 Department of Anatomical Sciences, Stony Brook University
Responsibilities: Writing and submission of grant proposals for the Madagascar Ankizy Fund, a not-for-profit organization seeking to provide healthcare and education to children living in Madagascar
Supervisor: Dr. David Krause

Other experience

- 2011-2012 Developed online materials for *Primate Adaptation and Evolution, Third Edition*
Supervisor: Dr. John Fleagle
- 2010 Coauthored introductions for extant primate families for the All the World's Primates Database
Supervisor: Noel Rowe

MENTORSHIP

Laboratory training and research mentor

- 2015 – present Provide training in molecular methods and assist with research design for undergraduate student projects at the Primate Genomics Lab, The George Washington University
- 2014 – 2015 Provided training in molecular methods and assisted with research design for an undergraduate senior thesis project through the Yale Molecular Anthropology Laboratory
Riley Rice: “Population genetics and paternity analyses of the red-bellied lemur (*Eulemur rubriventer*)”; Recipient of Peter and Marion Schwartz Family Foundation Prize in Biological Anthropology, Yale University.
- 2013 – 2014 Provided training in molecular methods (e.g., DNA extraction, amplification, high resolution melting analysis) for two graduate students at the Yale Molecular Anthropology Laboratory

Field training and research mentor

- 2011 – 2013 Trained four undergraduate students from the US and UK and two Master’s students from universities in Madagascar in behavioral data collection on wild lemurs. Assisted with project design for a Master’s thesis for one student from the University of Antananarivo
- 2011 – 2013 Provided training in behavioral data collection on wild lemurs and assisted with research design for undergraduate independent research projects for Madagascar study abroad programs (5 students)
- 2008 Trained one student from the University of Antananarivo in behavioral data collection on wild lemurs
- 2007 Trained one student from the University of Antananarivo in primate survey methods and botanical sampling

OTHER PROFESSIONAL & ACADEMIC SERVICE

- 2016 – 2017 AAPA 2017 Program Committee
- 2016 – 2017 Diversity in Science Steering Committee, CASHP, The George Washington University
- 2016 – 2017 Northeastern Evolutionary Primatology Group (NEEP), Secretary
- 2016 – 2017 CASHP Seminar Series Committee, The George Washington University
- 2016 – 2017 Organizer of Primatologists of Washington, DC Happy Hours
- 2014 – 2015 Ph.D. Admissions Committee, Stony Brook University
- 2014 – 2015 Behavioral Ecology Group, President, Stony Brook University

2010 – 2011	Behavioral Ecology Group, Vice President, Stony Brook University
2007 – 2010	Behavioral Ecology Group, Treasurer, Stony Brook University
2008 – 2009	Graduate Student Organization, Senator, Stony Brook University

OUTREACH

2016 World Lemur Festival: Designed activities for public engagement to promote awareness about lemur biology and conservation. Three events: one at the Smithsonian National Museum of Natural History, one at the Smithsonian National Zoological Park, one at Shaw's Tavern in Washington, DC.

2016 "Scientist is In" program (two events) at the Smithsonian National Museum of Natural History (<http://naturalhistory.si.edu/calendar.asp#/?i=4>): Designed and engaged the public in scientific activities; answered questions and shared my research on lemur color vision.

2016 BePolished Program (<http://bepolished.org/>): Designed and participated in scientific activities to help promote science and empower young girls from single parent homes in Washington, DC.

2011 – 2014 R Villages Exchange Program (<http://sunshinecomesfirst.org/projects/r-villages/>): Helped design and conducted workshops about Madagascar for teachers in the Rhinebeck School District. Gave a lecture to 6th grade students for "Madagascar Day".

MEDIA APPEARANCES

Island of Lemurs: Madagascar, Warner Bros./IMAX.