

Curriculum Vitae

SANDRA WINTERS

RESEARCH ASSOCIATE at the UNIVERSITY OF BRISTOL

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Research interests:

evolutionary ecology • adaptive coloration • visual ecology
complex signals • optimal phenotypes • computer vision

(Updated May 2020)

ACADEMIC POSITIONS

Research Associate (2019-present)

Camo Lab, School of Biological Sciences, *University of Bristol*, Bristol, UK

Supervisors: Innes Cuthill, Nick Scott-Samuel, Roland Baddeley

BBSRC funded project “Concealing 3D Objects”

EDUCATION

Ph.D. in Biological Anthropology, *New York University*, New York, NY, USA 2019

Dissertation: “Guenon face patterns and the maintenance of reproductive isolation”

Committee: James Higham (advisor), Tamra Mendelson, Martin Stevens, Todd

Disotell, Terry Harrison

M.S. in Primate Behavior, *Central Washington University*, Ellensburg, WA, USA 2011

Thesis: “Social recruitment in Tibetan macaques (*Macaca thibetana*) at Mt.

Huangshan, China”

Committee: Megan Matheson (advisor), Lori Sheeran, Steve Wagner

B.S. in Psychology & Anthropology, *University of Maryland*, College Park, MD, USA 2008

PUBLICATIONS

Google scholar profile: [goo.gl/84wbvo](https://scholar.google.com/citations?user=84wbvo)

In progress

Ghazanfar AA, Kelly LM, Takahashi DY, **Winters S**, Terrett R, Higham JP. Domestication phenotype linked to vocal behavior in a nonhuman primate. Submitted to *Science*.

Higham JP, Kimmock CM, Mandalaywala TM, Heistermann M, Cascio J, Petersdorf M, **Winters S**, Allen WL, Dubuc C. Female ornamentation: is red skin coloration attractive to males, and related to condition, in female rhesus macaques? Under revision at *Behavioral Ecology*.

Peer-reviewed journal articles

2020 **Winters S**, Allen W, Higham JP. The structure of species discrimination signals across a primate radiation. *eLife* 9:e47428. doi.org/10.7554/eLife.47428

Associated datasets & code:

Guenon image database: doi.org/10.5281/zenodo.3572780

Occlude-reclassify project code: doi.org/10.5281/zenodo.3574512

Cercopithecus mona looking time trials: doi.org/10.5281/zenodo.3572791

Cercopithecus nictitans looking time trials: doi.org/10.5281/zenodo.3572789

Looking time trial project code: doi.org/10.5281/zenodo.3574529

Minkner MMI, **Winters S**, Young C, Weiß B, Ganswindt A, Barrett L, Henzi P, Higham JP, Widdig A. Male characteristics as predictors of genital color and display variation in vervet monkeys. *Behavioral Ecology and Sociobiology* 74:14. doi.org/10.1007/s00265-019-2787-4

2019 Rigaiil L, Higham JP, **Winters S**, Garcia C. The redder the better? Skin coloration indicates quality in female Japanese macaques. *Behavioral Ecology and Sociobiology* 73:103. doi.org/10.1007/s00265-019-2712-x

2018 Dominy NJ, **Winters S**, Pease DE, Higham JP. Dr. Seuss and the real Lorax. *Nature Ecology and Evolution* 2:1196-1198. doi.org/10.1038/s41559-018-0628-x

2017 Petersdorf M, Dubuc C, Georgiev AV, **Winters S**, Higham JP. Is male rhesus macaque facial coloration under intrasexual selection? *Behavioral Ecology* 28:1472-1481. doi.org/10.1093/beheco/axx110

Rigaiil LR, MacIntosh AJJ, Higham JP, **Winters S**, Shimizu K, Mouri K, Suzumura T, Furuichi T, Garcia C. Testing for links between face color and age, dominance status, parity, weight, and intestinal nematode infection in a sample of female Japanese macaques. *Primates* 58:83-91. doi.org/10.1007/s10329-016-0575-6

2016 Dubuc C, Allen WL, Cascio J, Lee S, Maestriperi D, Petersdorf M, **Winters S**, Higham JP. Who cares? Experimental attention biases provide new insights into a mammalian sexual signal. *Behavioral Ecology* 27:68-74. doi.org/10.1093/beheco/arv117

2015 Rigaiil LR, MacIntosh AJJ, Higham JP, **Winters S**, Shimizu K, Mouri K, Furuichi T, Garcia C. Multimodal advertisement of pregnancy in free-ranging female Japanese macaques (*Macaca fuscata*). *PLoS One* 10:e0135127. doi.org/10.1371/journal.pone.0135127

Winters S, Dubuc C, Higham JP. Perspectives: the looking time experimental paradigm in studies of animal visual perception and cognition. *Ethology* 121:625-640. doi.org/10.1111/eth.12378

- 2014 Dubuc C, **Winters S**, Allen WL, Brent LJJ, Cascio J, Maestripieri D, Ruiz-Lambides AV, Widdig A, Higham JP. Sexually selected skin colour is heritable and related to fecundity in a non-human primate. *Proceedings of the Royal Society B: Biological Sciences* 281:20141602. doi.org/10.1098/rspb.2014.1602

Book chapters & encyclopedia entries

- 2019 **Winters S**, Petersdorf M, Higham JP. Charles Darwin and sexual selection in relation to sex in the colors of monkeys. In: *Darwin's Roadmap to the Curriculum: Evolutionary Studies in Higher Education*, Wilson DS, Geher G, Head H, Sokol-Chang R (eds). Oxford University Press. p 97-116. doi.org/10.1093/oso/9780190624965.003.0006
- 2018 **Winters S**. Aposematism. In: *Encyclopedia of Animal Cognition and Behavior*, Vonk J & Shackelford TK (eds). Springer. In press. Online first: doi.org/10.1007/978-3-319-47829-6_313-1
- Winters S**. Ornamentation. In: *Encyclopedia of Animal Cognition and Behavior*, Vonk J & Shackelford TK (eds). Springer. In press. Online first: doi.org/10.1007/978-3-319-47829-6_315-1
- 2016 Higham JP & **Winters S**. Color and mate choice in non-human animals. In: *Handbook of Color Psychology*, Elliott AJ, Fairchild MD, (eds). Cambridge University Press: Cambridge, UK. p 502-530. doi.org/10.1017/CBO9781107337930.025

Book & conference reviews

- 2015 **Winters S** & Higham JP. Martin Stevens: Sensory Ecology, Behaviour, and Evolution. *International Journal of Primatology* 36:205-208. doi.org/10.1007/s10764-015-9811-y
- Winters S**, Dunayer ES, Petersdorf M, Simons ND, Tinsman J. Primatology and conservation in Hanoi, Vietnam. *Evolutionary Anthropology* 23:201-204. doi.org/10.1002/evan.21429
- 2013 Higham JP, Amann AL, Bryer MAH, Thompson NA, **Winters S**. Review of The Evolution of Primate Societies (Eds. John C. Mitani, Josep Call, Peter M. Kappeler, Ryne A. Palombit, and Joan B. Silk). *International Journal of Primatology* 34:1298-1303. doi.org/10.1007/s10764-013-9731-7

Published abstracts

- 2018 Higham JP, Allen WA, **Winters S**. The evolution of guenon face patterns. *Primate Research Supplement* 34:48. doi.org/10.14907/primate.34.0_48_2
- 2017 Rigail L, MacIntosh AJJ, Higham JP, **Winters S**, Furuichi T, Garcia C. 2017. Face colour indicates female reproductive state but not individual characteristics in Japanese macaques (*Macaca fuscata*). *Folia Primatologica* 88:100-101. doi.org/10.1159/000479094

2015 Rigaill LR, MacIntosh AJJ, Higham JP, **Winters S**, Shimizu K, Mouri K, Furuichi T, Garcia C. Female Japanese macaques advertise pregnancy in multiple modalities. *Folia Primatologica* 86:346. doi.org/10.1159/000435825

Rigaill LR, MacIntosh AJJ, Higham JP, **Winters S**, Shimizu K, Mouri K, Furuichi T, Garcia C. Multiple sexual signals of pregnancy in Japanese macaques. *Primate Research Supplement* 31:72. doi.org/10.14907/primate.31.0_72_2

Milich KM, Dubuc C, **Winters S**, Allen WL, Rosenfield KA, Graham S, Higham JP, Maestripieri D. Red-hot males: sexual strategies of high-ranking male rhesus macaques (*Macaca mulatta*). *American Journal of Physical Anthropology* 156(S60):225-226. doi.org/10.1002/ajpa.22718

2014 **Winters S**, Kamilar JM, Webster TH, Bradley BJ, Higham JP. Primate camouflage as seen by felids, raptors, and conspecifics. *American Journal of Physical Anthropology* 153(S58):275. doi.org/10.1002/ajpa.22488

2011 Simons ND, **Winters S**, Lorenz JG. Comparative analysis of length polymorphisms in the promoter region of the serotonin transporter gene (SLC6A4) in Cercopithecidae. *American Journal of Primatology* 73(S1):83. doi.org/10.1002/ajp.20978

FUNDING

Fellowships

2015-2017 MacCracken Fellowship
New York University

2012-2015 NSF IGERT Training Fellowship
New York University

Competitive Research Grants

2016 Doctoral Dissertation Research Improvement Grant (**\$22,611**), “Guenon face patterns and the maintenance of primate reproductive isolation” (Role: Co-PI)
National Science Foundation

2015 General Small Grant (**\$1,250**), “Guenon face patterns and the maintenance of primate reproductive isolation” (Role: PI)
American Society of Primatologists

2010 Graduate Student Summer Research Fellowship (**\$3,500**), “Social recruitment in Tibetan macaques (*Macaca thibetana*) at Mt. Huangshan, China” (Role: PI)
Central Washington University

Master’s Research or Creative Activity Fellowship (**\$1,000**), “Social recruitment in Tibetan macaques (*Macaca thibetana*) at Mt. Huangshan, China” (Role: PI)
Central Washington University

TEACHING EXPERIENCE

Adjunct instructor:

Human Evolution, New York University (22 undergraduates): 2018

Human Origins Laboratory, New York University (2 x 22 undergraduates): 2018, 2014

Human Evolution Laboratory, New York University (2 x 22 undergraduates): 2017, 2014

Teaching assistant:

Quantitative Methods, New York University (15 graduate students): 2016

Genetics Laboratory, Central Washington University (2 x 30 undergraduates): 2010

Sociocultural Anthropology & Linguistics, University of Maryland College Park (20 undergraduates): 2007

Guest lectures:

2018 “Darwin and the origin of evolution by natural selection”
Human Origins, New York University (120 undergraduates)

2017 “Primate diet, predation, and ecology”
Human Evolution, New York University (120 undergraduates)

2016 “Introduction to R Programming”
“Mixed models”
Quantitative Methods, New York University (15 graduate students)

2014 “Studying primates in biological anthropology”
Departmental Seminar, New York University (10 graduate students)

2013 “Approaches in Behavioral Ecology I: Observation”
Primate Behavioral Ecology, New York University (20 undergraduates)

2010 “Forensic anthropology”
Introduction to Biological Anthropology, Central Washington University (60 undergraduates)

AWARDS

2014 Sherwood Washburn Award (Student Podium Presentation Award)
American Association of Physical Anthropology

INVITED TALKS

- 2018 “Linking visual signal form and function in primates: facial variability in guenons and rhesus macaques”
New York Consortium in Evolutionary Primatology, New York, NY, USA
- “The evolution of guenon face patterns as diverse mating signals”
New York University, New York, NY, USA
- 2016 “Guenon face patterns and the maintenance of primate reproductive isolation”
Yale University, New Haven, CT, USA
- 2014 “Primate camouflage in the eyes of felids, raptors, and conspecifics”
New York Consortium in Evolutionary Primatology, New York, NY, USA

MENTORING

Undergraduate research projects co-supervised:

- Lisa Ramirez (2018-2019; winner of NYU Holten Family Research Scholarship)
- Allegra Depasquale (2015-2016)

Undergraduate students mentored through the NYU Diversity Undergraduate Research Incubator program (promoting diversity in research/scholarship):

- Noelle Desir (2018)
- Lisa Ramirez (2018)

Undergraduate interns supervised in NYU Primate Reproductive Strategies Lab:

- Janki Tailor (2018)
- Elise Blegen (2017)
- Constanza Galindo (2016)
- Allegra Depasquale (2015)
- Alex Samaras (2015)
- Paul Brown (2014)

OUTREACH & SERVICE

Ad-hoc peer reviewer: The American Naturalist, Animal Behavior and Cognition, Animal Cognition, Behavioral Ecology, Ecology & Evolution, Integrative Zoology, PLoS One, Proceedings of the Royal Society B: Biological Sciences, Scientific Reports (review metrics: publons.com/a/1189818)

Leader of educational trips to the Bronx Zoo for undergraduates at NYU (2015, 2016)

Guest curator of @BioTweeps twitter handle (2016)

CONFERENCE PRESENTATIONS

(visuals for presentations since 2014 available at www.sandrawinters.net/presentations)

- 2019 Winters S & Higham HP. Simulating the evolution of inter-specific mating signal diversity: a machine learning approach [podium presentation]. Joint meeting of the 36th *International Ethological Conference* and the 56th *Annual Conference of the Animal Behavior Society*, Chicago, USA.
- 2017 Winters S, Allen WL, Higham JP. Analyzing visual signals using biologically-inspired computer vision algorithms [podium presentation]. Joint meeting of the 35th *International Ethological Conference* and the 2017 *Summer Meeting of the Association for the Study of Animal Behaviour*, Estoril, Portugal.
- 2016 Winters S & Higham JP. Visual biases and the evolution of species discrimination in guenons [podium presentation]. Joint meetings of the 26th *Congress of the International Primatology Society* and the 39th *Meeting of the American Society of Primatologists*, Chicago, IL, USA.
- Winters S & Higham JP. Visual biases and the evolution of species discrimination in guenons [podium presentation]. 16th *International Behavioral Ecology Congress*, Exeter, UK.
- 2015 Winters S, Kamilar JM, Webster TH, Bradley BJ, Higham JP. Primate camouflage as seen by felids, raptors, and conspecifics [poster]. 52nd *Annual Conference of the Animal Behavior Society*, Anchorage, AK, USA.
- 2014 Winters S, Allen WL, Higham JP. Machine learning reveals facial regions critical for species recognition in guenons [poster]. 25th *Congress of the International Primatological Society*, Hanoi, Vietnam.
- Winters S, Allen WL, Higham JP. Machine learning reveals facial regions critical for species recognition in guenons [poster]. 15th *International Behavioral Ecology Congress*, New York, NY, USA.
- Winters S, Kamilar JM, Webster TH, Bradley BJ, Higham JP. Primate camouflage as seen by felids, raptors, and conspecifics [podium presentation]. 83rd *Annual Meeting of the American Association of Physical Anthropologists*, Calgary, Canada.
- 2011 Winters S & Sheeran SK. Maternal response to infant disability: a case study of traumatic injury to an infant Tibetan macaque (*Macaca thibetana*) [podium presentation]. *Society for Psychological Anthropology Conference*, Spokane, WA, USA.
- Winters S, Sheeran LK, Wagner S, Li J, Matheson M. Social recruitment in Tibetan macaques (*Macaca thibetana*) at Mt. Huangshan, China [podium presentation]. 64th *Northwest Anthropology Conference*, Moscow, ID, USA.

Winters S & Sheeran SK. Maternal response to infant disability: a case study of traumatic injury to an infant Tibetan macaque (*Macaca thibetana*) [podium presentation]. *64th Northwest Anthropology Conference*, Moscow, ID, USA.

Winters S, Simons N, Lorenz. Polymorphisms in the promoter region of the serotonin transporter gene in cercopithecine primates [podium presentation]. *64th Northwest Anthropology Conference*, Moscow, ID, USA.

2010 Winters S. 2010. Enrichment use in captive orangutans at Smithsonian National Zoological Park [poster]. *63rd Northwest Anthropology Conference*, Ellensburg, WA, USA.

TECHNICAL SKILLS

Programming	Languages: MATLAB, R, Python, Java, Visual Basic, NetLogo, JavaScript, HTML
	Skills: machine learning, computer vision, image processing & analysis, artificial neural networks, agent-based modeling, data wrangling
Statistics	generalized linear mixed models, phylogenetic comparative methods
Laboratory	DNA extraction (saliva), PCR, gel electrophoresis, ELISA enzyme immunoassays
Field	standardized image collection, looking time experiments, audio playback experiments, behavioral data collection, collection of biological samples (e.g. swabs, hair samples), ecological data collection, handling anesthetized primates

PROFESSIONAL AFFILIATIONS

American Association of University Women (2016-present)
American Society of Primatologists (2010-2016)
Animal Behavior Society (2011-present)
International Primatological Society (2010-2017)
International Society for Behavioral Ecology (2014-present)
Northeastern Evolutionary Primatologists (2014-present)
Society for the Study of Evolution (2018-present)

CERTIFICATIONS

Wilderness First Aid (2016)
USA Driver's License (2002-present)

CONTACT INFORMATION

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Skype: sandywinters