

CURRICULUM VITAE

Paul L. Babb

Ph.D. Candidate

Department of Anthropology, University of Pennsylvania

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RESEARCH INTERESTS

Genomic evolution within the Order Primates, molecular phylogenetics, socioecology, phylogeography, population genetics and the processes of Natural and Sexual Selection. More specifically, my research is focused on detecting and identifying the underlying functional genetic changes that have helped shape the evolution of complex social behavior in primate species.

EDUCATION

- 2009-Present Ph.D. Candidate, Physical Anthropology, University of Pennsylvania, Philadelphia, PA
•*Oral Proposal Defense completed.*
•*Expected Dissertation Defense date: April 2012.*
- Dissertation “*Molecular evolution of vasopressin and oxytocin receptor genes in owl monkeys (Aotus azarai azarai) of Northern Argentina: Implications for the evolution of monogamous social behavior.*”
- 2006-2009 Ph.D. Student, Physical Anthropology, University of Pennsylvania, Philadelphia, PA
•*Comprehensive Examinations completed, with distinction.*
•*All course and teaching requirements completed.*
- 2003 B.A., Physical Anthropology, University of Pennsylvania, Philadelphia, PA
- 1999 Advanced Diploma, Loudoun Valley High School, Purcellville, VA

RESEARCH EXPERIENCE

Laboratory of Molecular Anthropology, University of Pennsylvania

September 2006 - Present

Philadelphia, PA

Currently studying the phylogeography, social organization and population structure of a wild population of owl monkeys (*Aotus azarai*) using DNA sequencing and other molecular biological techniques.

Laboratory for Cytogenetic Pathology, Harvard Medical School / Brigham & Women’s Hospital

June 2009 - Present

Boston, MA

Conducted state-of-the-art investigatory microarray assays to reveal the levels of structural variation present in the genomes of rhesus macaques (*Macaca mulatta*). Discovered and analyzed copy number variants (CNVs) using aCGH platforms, and validated finds via M-FISH, PCR, and qPCR.

Department of Proteomics, Harvard Partners Center for Genetics and Genomics

August 2005 - August 2006

Cambridge, MA

Investigated disease biomarker proteins and conducted pathogen proteome sequencing for the Boston medical and scientific communities using liquid chromatography and mass spectrometry.

Laboratory for Molecular Medicine, Harvard Partners Center for Genetics and Genomics

September 2004 - August 2005

Cambridge, MA

Designed and validated 12 new pharmacogenetic DNA sequencing tests for clinical diagnostic purposes. Integrated strict QC/QA methods into high-throughput test panels to conform to both HIPAA and CLIA governmental clinical regulations.

Laboratory of Neurogenetics, National Institutes of Health, NIAAA

September 2003 - September 2004

Rockville, MD

Investigated dopamine pathway neurotransmitter genes, including *SERT*, *MAOA*, *COMT* and *DRD4* for the evolutionary contextualization of their structure and function in human and non-human primates.

Laboratory of Molecular Anthropology, University of Pennsylvania

March 2002 - September 2003

Philadelphia, PA

Conducted mitochondrial DNA research through PCR, RFLP and direct sequencing to identify human population migration and settlement patterns in circum-arctic and Oceanic populations.

PUBLICATIONS

- Fernandez-Duque E, Huck M, **Babb PL**, Schurr TG. (*In Preparation*). Autosomal variation and the socioecology of monogamous owl monkeys. *Journal TBD*.
- Fernandez-Duque E, **Babb PL**, Huck M, Schurr TG. (*In Preparation*). Socioecology of matrilineal lines in Azara's owl monkeys based on mitochondrial DNA. *Journal TBD*.
- McIntosh AM, **Babb PL**, Fernandez-Duque E, Schurr TG. (*In Preparation*). PRLR evolution in monogamous owl monkeys and other platyrrhines. *Journal of Molecular Evolution*.
- Babb PL**, Fernandez-Duque E, Schurr TG. (*In Preparation*). Monogamous owl monkeys differ in the structure of OXTR from other non-monogamous primates. *Journal TBD*.
- Babb PL**, Fernandez-Duque E, Baiduc C, Gagneux P, Evans S, Schurr TG. (2011). MtDNA diversity in Azara's owl monkeys (*Aotus azarai azarai*) of the Argentinean Chaco. *American Journal of Physical Anthropology* 146(2): 209-224.
- Babb PL**, McIntosh AM, Fernandez-Duque E, Di Fiore A, Schurr TG. (2011). An optimized genotyping strategy for assessing genetic identity and kinship in Azara's owl monkeys (*Aotus azarai*). *Folia Primatologica* 82: 107-117.
- Gokcumen O*, **Babb PL***, Iskow R, Zhu Q, Shi, X, Mills RE, Ionita-Laza I, Vallender EJ, Clark AG, Lee C[†], Johnson WE[†]. (2011). Refinement of primate copy number variation hotspots identifies candidate genomic regions evolving under positive selection. *Genome Biology* 5(12): R52. [* Co-first authors; † Co-senior authors].
- Babb PL**, Fernandez-Duque E, Schurr TG. (2010). AVPR1A sequence variation in monogamous owl monkeys (*Aotus azarai azarai*) and its implications for the evolution of platyrrhine social behavior. *Journal of Molecular Evolution* 71:279-297.
- Friedlaender J, Schurr T, Gentz F, Koki G, Friedlaender F, Horvat G, **Babb PL**, Cerchio S, Kaestle F, Schanfield M, Deka R, Yanagihara R, Merriwether DA. (2005). Expanding Southwest Pacific Mitochondrial Haplogroups P and Q. *Molecular Biology and Evolution*. 22(6): 1506-1517.
- Rubicz R, Schurr TG, **Babb PL**, Crawford MH. (2003). Mitochondrial DNA Variation and Origins of the Aleuts. *Human Biology* 75(6): 809-35.
- ## PUBLISHED ABSTRACTS
- Babb PL**, Fernandez-Duque E, Schurr TG. (2011). Monogamous owl monkeys differ in the structure of OXTR from other non-monogamous primates. *American Journal of Physical Anthropology* 144(S52):79.
- Fernandez-Duque E, **Babb PL**, Schurr TG. (2011). Group structure and dispersal patterns of the socially monogamous owl monkey as revealed by mtDNA data. *American Journal of Physical Anthropology* 144(S52):135.
- Babb PL**, Fernandez-Duque E, Schurr TG. (2009). Vasopressin receptor V1a (*avpr1a*) gene variation in the monogamous owl monkey, *Aotus azarai azarai*. *American Journal of Physical Anthropology* 138(S48):81.
- Babb PL**, Gagneux P, Fernandez-Duque E, Schurr TG. (2008). Genetic variation and population structure in the owl monkey, *Aotus azarai*. *American Journal of Physical Anthropology* 135(S46):62.
- Babb PL**, Sithaldeen R, Ackermann RR, Newman TK. (2005). Mitochondrial DNA sequence evidence for a deep phylogenetic split in chacma baboons (*Papio hamadryas ursinus*) and the phylogeographic implications for papio systematics. *American Journal of Physical Anthropology* 126(S40):67.
- Newman TK, Howell S, Barr CS, **Babb PL**, Westergaard GC, Higley JD. (2005). Genetic and environmental influences on acquired dominance status in free ranging male rhesus macaques (*Macaca mulatta*). *American Journal of Physical Anthropology* 126(S40):157.
- Newman TK, Barr CS, **Babb PL**, Champoux, M, Suomi SJ, Lesch K-P, Higley JD. (2004). MAOA gene promoter polymorphism influences aggression and impulsivity in male rhesus macaques (*Macaca mulatta*). *Neuropsychopharmacology* 29:S233.

Newman TK, Barr CS, **Babb PL**, Becker M, Suomi SJ, Lesch K-P, Higley JD. (2004). Social impulsivity in captive rhesus monkeys (*Macaca mulatta*) is influenced by variation in a functional MAOA gene promoter polymorphism. *American Journal of Primatology* 62(S1): 102.

Newman TK, Gibson N, **Babb PL**, Higley JD, Goldman D. (2004). Comparative sequence analysis of a repeat polymorphism in the monoamine oxidase A (MAOA) gene promoter region in primates: evidence for selection? *American Journal of Physical Anthropology* 123(S38):152.

ADDITIONAL PRESENTATIONS

Gokcumen O, **Babb PL**, Lee A, Mills RE, Smith RS, Vallender EJ, Blake-Kinnin ME, Lee C, Johnson WE. Copy number variation among rhesus macaques: Evolutionary and phenotypic implications. *59th Annual American Society of Human Genetics Meetings*. Poster Presentation (by Dr. Omer Gokcumen): October 20, 2009.

Gokcumen O, **Babb PL**, Lee A, Mills RE, Smith RS, Vallender EJ, Blake-Kinnin ME, Lee C, Johnson WE. High Resolution Discovery of Copy Number Variation among Rhesus Macaques (*Macaca mulatta*). *27th Annual Symposium on Nonhuman Primate Models for AIDS*. Podium Presentation (by Dr. Omer Gokcumen): October 31, 2009.

Babb PL, Wu E, Krastins B, Stoerker J, Sarracino D. Using Immobilized Lectins for Proteomic Analysis of Glycosylated Proteins in Human Plasma. *Harvard-Partners Center for Genetics and Genomics: Proteomics Symposium*. Poster Presentation: January 4, 2006.

Krastins B, **Babb PL**, Satish KK, Wilson SB, Sarracino D. Phosphorylated Proteins and Peptides from Stimulated and Unstimulated Jurkat Cells. *Harvard-Partners Center for Genetics and Genomics: Proteomics Symposium*. Poster Presentation: January 4, 2006.

Joshi VA, Verlander P, Anderson ND, **Babb PL**, Fulchiero E, Lindeman N, Longtime J, Louis DN, Janne PA, Sequist LV, Bell DW, Haber DA, Meyerson M, Johnson BE, Lynch TJ, Kucherlapati R. EGFR Kinase Domain Sequencing for the Prediction of Drug Response: the Mutation Spectrum. *AACR Annual Conference*. Podium Presentation (by Dr. Victoria Joshi): January 14, 2005.

FIELDWORK

Focal observation of wild Azara's owl monkeys (*Aotus azarai azarai*) in Formosa, Argentina (Summer 2008).

PROFESSIONAL ACTIVITIES

2011-Present Education Committee Member American Association of Anthropological Genetics (AAAG)
Co-organizing the Application of Genomics to Anthropological Research (AGAR) workshop, to be held from January 4th - 6th, 2012 at the Texas Biomedical Research Institute (San Antonio, TX).

GRANTS, AWARDS & FELLOWSHIPS

Prior Grants and Fellowships (Financial)

- U. Penn GAPSA Travel Grant, 2008
(\$350 for travel to 2008 AAPA meetings)
- U. Penn Dept. of Anthropology Field Funds Grant, Summer 2008
(\$1960 for field work expenses in Formosa, Argentina)
- U. Penn Dept. of Anthropology Research Fellowship, Summer 2007
(\$2500 for mitochondrial and autosomal DNA research in owl monkeys)
- U. Penn Benjamin Franklin Fellowship, 2006-2011
(\$53,000 per academic year [stipend + tuition] over the course of 5 years)
- U. Penn GAPSA-Provost Award for Interdisciplinary Innovation, Summer 2010
(\$6,000 for behavioral genetic research [OXTR] in owl monkeys)
- L.S.B. Leakey Foundation General Research Grant, January 2011-December 2011
(\$13,200 for neurogenetic expression studies in owl monkeys)
- U. Penn GAPSA Travel Grant, 2011
(\$350 for travel to 2011 AAPA meetings)
- U. Penn SAS Dissertation Completion Fellowship, 2011-12
(\$53,000 [stipend + tuition] to support the completion of degree by May 2012)

Prior Awards (Non-Financial)

- CTL Fellowship for Teaching Excellence, 2009 (Anthropology Dept. nominee)
- U. Penn Graduate School of Arts and Sciences *Dean's Scholar*, 2008
- U. Penn *Dean's List*, 2006-2009 (*graduate*)
- Harvard Partners Center for Genetics & Genomics, Partners in Excellence Award, 2004
- National Institutes of Health Post-Baccalaureate IRTA Fellowship, 2003-2004
- U. Penn *Dean's List*, 2002-2003 (*undergraduate*)

TEACHING EXPERIENCE

- | | | |
|---------------------|---------------------------------|--------------------|
| • Anthropology 003: | Introduction to Human Evolution | <i>Spring 2009</i> |
| • Anthropology 104: | Sex and Human Nature | <i>Fall 2008</i> |
| • Anthropology 003: | Introduction to Human Evolution | <i>Spring 2008</i> |
| • Anthropology 003: | Introduction to Human Evolution | <i>Fall 2007</i> |

COLLABORATORS & CO-AUTHORS

Ms. Caitlin Baiduc, Cell and Molecular Biology, School of Medicine, University of Pennsylvania
Ms. Jennifer Crick, Department of Anthropology, Swarthmore College
Dr. Anthony Di Fiore, Department of Anthropology, New York University.
Dr. Sian Evans, DuMond Conservancy for Primates and Neotropical Forests
Dr. Pascal Gagneux, Dept. of Cellular and Molecular Medicine, Univ. of California-San Diego
Dr. Omer Gokcumen, Cytogenetic Pathology, Harvard Medical School
Dr. Jonathan Friedlaender, Department of Anthropology, Temple University
Dr. Maren Huck, Department of Anthropology, University of Pennsylvania
Dr. Welkin Johnson, Dept. of Microbiology and Molecular Genetics, Harvard Med. / NEPRC
Dr. Charles Lee, Cytogenetic Pathology, Harvard Med. School / Brigham and Women's Hospital
Ms. Annick McIntosh, Department of Anthropology, Yale University
Dr. D. Andrew Merriwether, Department of Anthropology, Binghamton University
Dr. Ryan Mills, Cytogenetic Pathology, Harvard Medical School
Dr. Timothy Newman, Cape Biotech Trust Biotechnology Innovation Centre, South Africa
Dr. Claudia Vallengia, Department of Anthropology, University of Pennsylvania

GRADUATE ADVISORS

Dr. Theodore G. Schurr, Department of Anthropology, University of Pennsylvania
Dr. Eduardo Fernandez-Duque, Department of Anthropology, University of Pennsylvania
Dr. R. Arlen Price, Department of Psychology, School of Medicine, University of Pennsylvania

ADDITIONAL SKILLS

- *Languages*: Proficient in English and French.
- *Computational Abilities*: Microsoft Word, PowerPoint, Excel, ArcView 9.x, ArcMap, ArcScene, and research utilizing UCSC Genome Browser, Ensembl, BLAST and NCBI Databases. Skilled on both Macintosh and PC computer platforms along with a multitude of application-specific laboratory automated equipment, robotics, and command line computational scripting.
- *Safety Training*: Universal Precautions, Laboratory Safety, Working Safely with HIV and Bloodborne Pathogens, Using Animals in Intramural Research, Working Safely with Non-Human Primates, Hands-On Animal Techniques, Computer Security, and Protecting Human Subjects.
- *Statistics*: Parametric and non-parametric statistical analyses. Experienced with genomic, phylogenetic and population genetic statistical analyses.
- *Travel*: Extensive experience researching outside the USA (Europe, Asia, South America and Africa).
- *Interests*: Enjoy automotive restoration and customization, international travel, autocross racing, electronic music composition and graphic design.