

## Beth Shapiro

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## Curriculum Vitae

Born: 14 Jan 1976  
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### Education:

DPhil (Zoology) Oxford University, 2003.  
MS (Ecology) University of Georgia, 1999.  
BS (Ecology) University of Georgia, 1999 *Suma Cum Laude, With Highest Honors.*

### Current Position:

Shaffer Career Development Assistant Professor, Department of Biology, The Pennsylvania State University (2007- present)

### Past Positions:

Director, Henry Wellcome Ancient Biomolecules Centre, Oxford University (2004-2007)  
Royal Society University Research Fellow, Oxford University (2006-2007)  
Wellcome Trust Research Fellow, Oxford University (2004-2006)

### Selected Honors and Awards:

Searle Scholar, 2009  
Visiting Fellow, Isaac Newton Institute for Mathematical Sciences, 2007  
Smithsonian Young Innovator, 2007  
University Research Fellow, The Royal Society, 2006  
Research Fellow, The Wellcome Trust, 2006  
Research Fellow, Balliol College, Oxford University 2002-2007  
Rhodes Scholar, 1999

### Scientific Service:

Associate Editor, *Molecular Biology and Evolution* (2007- current).  
Guest Editor: *Proceedings of the National Academy of Sciences USA* (current).  
Reviewer for >20 peer-review journals including *Science*, *PLoS Biology*, *Current Biology*, *PNAS*, *Proc Roy Soc B*, *Biology Letters*, *Molecular Ecology*.

### Publications:

1. Ramsden C, Charleston MA, Duffy S, **Shapiro B**, Holmes EC. Insights into the evolutionary history of an emerging livestock pathogen,: Porcine Circovirus 2. *J Virol* (in press).
2. Haile J, Larson G, Owens K, Dobney K, **Shapiro B**. Ancient DNA typing of Archaeological Pig Remains Corroborates Historical Records. *J Arch Sci* (in press).
3. Richards M, **Shapiro B**, Ditchfield P, Cooper A. Bison bone collagen isotopic values track climate fluctuations and vegetation change in Late Pleistocene and Early Holocene Northern Eurasia and North America. *Geological Journal* (in press).
4. Cordingly JE, Sundarisan SR, Fischhoff IR, **Shapiro B**, Ruskey J, Rubenstein DI. Is the endangered Grevy's zebra threatened by hybridization? *Anim. Conserv.* (in press).
5. Zazula GD, MacKay G, Andrews TD, **Shapiro B**, Letts B, Brock F. A Late Pleistocene steppe bison (*Bison priscus*) partial carass from Tsiigehtchic, Northwest Territories, Canada. *Quat Sci Rev* (in press).

6. Collins MJ, Penkman KEH, Rohalnd N, **Shapiro B**, Dobberstein RC, Rotz-Timme A, Hofretier M. Is amino acid racemization a useful tool for screening for ancient DNA in bone? *Proc Roy Soc B* 276: 2971-2977 (2009).
7. Weinstock J, **Shapiro B**, Prieto A, Martin JC, Gonzáles BA, Gilbert MPT, Willerslev E. The Late Pleistocene distribution of vicuñas (*Vicugna vicugna*) and the “extinction” of the gracile llama (*Lama gracilis*): new molecular data. *Quat. Sci. Rev.* 28: 15-16 (2009).
8. Barnett R, **Shapiro B**, Ho SYW, Barnes I, Burger J, Yamaguchi N, Higham T, Wheeler, HT, Rosendhal W, Sher AV, Baryshnikov G, Cooper A. Phylogeography of lions (*Panthera leo*) reveals three distinct taxa and a Late Pleistocene reduction in genetic diversity. *Mol. Ecol.* 18: 1668-1677 (2009).
9. Rambaut A, Drummond AJ, Ho SYW **Shapiro B**. Accommodating the effect of ancient DNA damage on inferences of demographic histories. *Mol. Biol. Evol.* 26: 245-248 (2009).
10. Rijdsdijk KF, Hume JP, Bunnik F, Florens V, Baider C, **Shapiro B**, et al. A Middle-Holocene Concentration-Lagerstätten on Mauritius provides a window into the ecosystem of the dodo (*Raphus cucullatus*). *Quat. Sci. Rev.* 28: 14-24 (2009).
11. Wilson M, **Shapiro B**, Hills LV. Late Pleistocene northward-dispersing *Bison antiquus* from the Bighill Creek Formation, Gallelli Gravel Pit, Alberta, Canada, and the fate of *Bison occidentalis*. *Can. J. Earth Sci.* 45: 827-859 (2008).
12. Dalén L, Götherström A, **Shapiro B**. DNA from footprints in the snow. *Can. Field Nat.* 12: 321-324 (2008).
13. **Shapiro B**. Engineered polymerases amplify the potential of ancient DNA. *Trends Biotech.*, 26: 285-287 (2008).
14. Ho SYW, Larson G, Edwards CJ, Heupink TH, Lain KE, Holland PWH, **Shapiro B**. Correlating Bayesian date estimates with climatic events and domestication using a bovine case study. *Biol. Lett.*, 274: 1377-1385 (2008).
15. Ho SYW, Saarma U, Barnett R, Haile J, **Shapiro B**. The effect of inappropriate calibration in molecular ecological studies: three case studies *PLoS ONE* 3: e1615 (2008).
16. Barnett R, Yamaguchi N, **Shapiro B**, Sabin R. Ancient DNA analysis indicates the first English lions originated from North Africa, *Contrib. Zool.* 77: 7-16 (2008).
17. Kapoor A, **Shapiro B**, Shafer RW, Rhee S-Y, Delwart EL. Multiple independent origins of protease inhibitor resistance mutation in salvage therapy patients. *Retrovirology* 5: 7 (2008).
18. Buckley M, Walker A, Ho SYW, Yang Y, Smith C, Ashton P, Oates JT, Cappellini E, Koonn H, Penkman K, Elsworth B, Ashford D, Solazzo C., Andrews P, Strahler J, **Shapiro B**, Ostrom P, Gandhi H, Miller W, Raney B, Zylber MI, Gilbert MTP, Prigodich RV, Ryan M, Rijdsdijk KF, Janoo A, Collins M. Comment on “Protein sequences from Mastodon and *Tyrannosaurus rex* revealed by mass spectrometry” *Science* 319: 33 (2008).
19. Barnett R, Yamaguchi N, **Shapiro B**, Nijman V. Using ancient DNA techniques to identify the origin of an unprovenanced museum specimen, as illustrated by the identification of a 19th century lion from Amsterdam, *Contrib. Zool.* 76: 87-94 (2007).
20. Deforche K, Camacho, R., Laethem, KV, **Shapiro B**., Moreau Y, Rambaut A, Vandamme, AM, Lemey P. Estimating the relative contribution of dNTP pool imbalance and APOBEC3G/3F editing to HIV evolution in vivo. *Journal of Computational Biology* 14: 1105-1114 (2007).
21. Abecasis AB, Lemey P, Vidal N, de Oliveira T, Peeters M, Camacho R, **Shapiro B**, Rambaut A, Vandamme A-M. Recombination is confounding the early evolutionary history of HIV-1: subtype G is a recombinant. *J. Virol.* 81: 8543-51 (2007).
22. Ho SYW, **Shapiro B**, Phillips MJ, Cooper A, Drummond AJ. Evidence for time dependency of molecular rate estimates. *Sys. Biol.* 56: 515-522 (2007).
23. Barnes I, **Shapiro B**, Kuznetsova T, Sher A, Guthrie D, Lister A, Thomas MG. Genetic structure and extinction of the woolly mammoth. *Curr. Biol.* 17: 1072-1075 (2007).

24. Ho SYW, Heupink, TH, Rambaut, A, **Shapiro B**. Bayesian estimation of sequence damage in ancient DNA. *Mol. Biol. Evol.* 24:1416-1422 (2007).
25. Edwards CJ, Bollongino R, Scheu A, Chamberlain A, Tresset A, Vigne J-D, Baird JF, Larson G, Ho SYW, Heupink TH, **Shapiro B**, Freeman AR, *et al.* Mitochondrial DNA analysis shows a Near Eastern Neolithic origin for domestic cattle and no indication of domestication of European aurochs. *Proc. Roy. Soc B.* 274: 1377-1385 (2007).
26. Rector A, Lemey P, Tachezy R, Mostmans S, Ghim S, Van Doorslaer K, Roelke M, Bush M, Montali RJ, Joslin J, Burk R, Jenson A, Sundberg JP, **Shapiro B**, Van Ranst M. Ancient papillomavirus-host co-speciation in Felidae. *Genome. Biol.* 8:R57 (2007).
27. Haile J, Holdaway R, Oliver K, Bunce M, Gilbert MTP, Nielsen R, Munch K, Ho, SYW, **Shapiro B**, Willerslev E. Ancient DNA chronology within sediment deposits: is DNA leaching a factor? *Mol. Biol. Evol.* 24: 982-989 (2007).
28. Lemey P. Kosakovsky-Pond SL, Drummond A, Pybus O, **Shapiro B**, Barroso H, Taveira N, Rambaut A. Synonymous substitution rates predict HIV disease progression as a result of underlying replication dynamics. *PLoS Comp. Biol* 3:e29 (2007).
29. **Shapiro B**, Rambaut A, Gilbert MTP. No proof that typhoid caused the Plague of Athens. *Int. J Infect. Dis.* 10:334-335 (2006).
30. **Shapiro B**, Rambaut A, Drummond AJ. Choosing appropriate substitution models for the phylogenetic analysis of protein-coding sequences *Mol. Biol. Evol.* 23: 7-9 (2006).
31. Poinar HN, Schwartz C, Qi J, **Shapiro B**, MacPhee RD, Buiges B, Tikhonov A, Huson D, Tonsho L, Auch A, Rampp M, Miller W, Schuster SC. Metagenomics to paleo-genomics: large scale sequencing of mammoth DNA. *Science* 311: 392-394 (2006).
32. **Shapiro B**, Drummond AJ, Rambaut A, Pybus OJ, Holmes EC. A phylogenetic method to detect positive epistasis and its application to virus evolution. *Mol. Biol. Evol* 23:1724-1730 (2006).
33. Gilbert MTP, **Shapiro B**, Drummond A, Cooper A. Post-mortem DNA damage hotspots in Bison (*Bison bison* and *B. bonasus*) provide supporting evidence for mutational hotspots in human mitochondria. *J. Arch. Sci.* 32:1053-1060 (2005).
34. Drummond AJ, Pybus OG, **Shapiro B**, Rambaut A. Bayesian coalescent inference of past population dynamics from molecular sequences. *Mol. Biol. Evol.* 22:1185-1192 (2005).
35. Bunce M, Szulkin M, Lerner HRL, Barnes I, **Shapiro B**, Cooper A, Holdaway RN. The evolutionary history of New Zealand's extinct giant eagle revealed by ancient DNA. *PLoS Biology* 3(1) e20 (2005).
36. **Shapiro B**, Drummond AJ, Rambaut A, Wilson MC, Matheus P, Sher AV, Pybus OG, *et al.* Rise and fall of the Beringian steppe bison. *Science* 306: 1561-1565 (2004).
37. Gilbert MTP, Wilson AS, Bunce M, Hansen AJ, Willerslev E, **Shapiro B**, Higham TFG, Richards MP, O'Connell TC, Tobin DJ, Janaway RC, Cooper A. (2004). Ancient mitochondrial DNA from hair. *Curr. Biol.* 14: R463-464 (2004).
38. **Shapiro B**, 2004. Book review: Return of the Crazy Bird: the Sad, Strange Tale of the Dodo by Clara Pinto-Correia. *Quart. Reve. Biol.* 79: 197-198.
39. **Shapiro B**, Cooper A. Beringia as an Ice Age genetic museum. *Quat. Res.* 60: 94- 100 (2003).
40. Willerslev E, Hansen AJ, Binladen J, Brand TB, Gilbert MTP, **Shapiro B**, Bunce M, Wiuf C, Gilichinsky DA, Cooper A. Diverse plant and animal genetic records from Holocene and Pleistocene sediments. *Science* 300: 791-795 (2003).
41. Nielsen-Marsh, CM, Ostrom PH, Gandhi H, **Shapiro B**, Cooper A, Collins MJ. Exceptional preservation in >55 ka BP bison bones demonstrated by protein and DNA sequences. *Geology* 30: 1099-1102 (2002).
42. Lalueza-Fox, C, **Shapiro B**, Bover P, Alcover JA, Bertranpetit J. Molecular phylogeny and evolution of the extinct bovid *Myotragus*. *Mol. Phyl. Evol.* 25 (3): 501-510 (2002).
43. **Shapiro B**, Sibthorpe D, Austin J, Wragg G, Lee PLM, Bininda-Emonds ORP, and Cooper A. Flight of the Dodo. *Science* 295: 1683 (2002).

44. Barnes I, Matheus P, **Shapiro B**, Jensen D, Cooper A. Dynamics of mammal population extinctions in eastern Beringia during the last glaciation. *Science* 295: 2267-2270 (2002).
45. Beck CW, **Shapiro B**, Choksi S, Promislow DEL. A genetic algorithm approach to study the evolution of female preference based on male age. *Evol. Ecol. Res* 4: 275-292 (2002).
46. **Shapiro BA**, Pickering J. Rainfall and parasitic wasps (Hymenoptera: Ichneumonoidea) activity in successional forest stages at Barro Colorado Nature Monument, Panama and La Selva Biological Station, Costa Rica. *Agr. For. Ent.* 2: 39-47 (2000).

**Book chapters:**

- Shapiro B, Gilbert MTP, Barnes I. Using DNA to investigate human evolution. In H Schutkowski, *Between Biology and Culture*. Cambridge University Press (2009).
- Pybus OG, Shapiro B. Natural selection and adaptation of molecular sequences. In Lemey P, Salemi N, Vandamme A-M. *The Phylogenetics Handbook*. Cambridge Univ. Press (2009).
- Barnett R, Shapiro B, Barnes I. Ancient DNA from vertebrate fossils. In Elias SA, Ed. *Encyclopedia of Quaternary Science*. Elsevier (2006).

**Selected Invited/plenary talks:**

- Shapiro B. The rise and the fall of the Beringian megafauna. *15th Annual German-American Frontiers of Science Symposium*. Alexander von Humboldt Foundation. Irvine, California (upcoming: April 2009).
- Shapiro B. Reconstructing demographic change through space and time. International Biogeography Society, Merida Mexico (January 2009).
- Shapiro B. Did we kill the Megafauna? *Harvard Symposium on the Scientific Study of the Human Past*. Harvard University, Cambridge, MA (December 2008).
- Shapiro B. How to clone a Dodo. *DNA and Darwin Series*, The Chautauqua Institute, Chautauqua, NY (August 2008).
- Shapiro B. Using gene sequences to trace evolution through time and space. *Andrew W Mellon DNA and History seminar series*, UCLA (January 2008).
- Shapiro B. Ancient DNA: advances in phylogenetic methods. *Fundación Ramon Areces*, Madrid, Spain (April 2007).

**Current Funding:**

- NSF ARC-0909456. Collaborative Research: Understanding the role of environmental change on the long-term population dynamics of one surviving and two extinct arctic mammals. Role: PI. Co-Is: Robert Wayne and Matthew Wooller (2009-2012).
- NASA Astrobiology Institute. PSARCI: Signatures of life from Earth and beyond. Role: Co-I (one of 17). Christopher House, PI (2009-2014).
- NIH R01 GM083983-01. Synthesizing the evolutionary and ecological dynamics of acute RNA viruses: Comparative analyses and methods development. Role: Co-I. Bryan Grenfell (Princeton University) PI (2006-2011).
- NIH R01 GM083603-01. Novel statistical models for synthesizing social networks and epidemic dynamics. Role: Co-I (with Mary Poss, Ottar Bjornstad, Bryan Grenfell). David Hunter (PSU) PI (2007-2012).