

Beth Shapiro

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Curriculum Vitae

University of California Santa Cruz
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Education:

DPhil (Zoology) Oxford University, 2003
MS (Ecology) University of Georgia, 1999
BS (Ecology) University of Georgia, 1999

Current Position:

Professor, Ecology and Evolutionary Biology, UC Santa Cruz, (2016- present)
Director of Evolutionary Genomics, UCSC Genomics Institute, UC Santa Cruz (2015-present)

Past Positions:

Associate Professor, Ecology and Evolutionary Biology, UC Santa Cruz, (2012- 2016)
Shaffer Associate Professor, Department of Biology, The Pennsylvania State University (2011-2012)
Shaffer Assistant Professor, Department of Biology, The Pennsylvania State University (2007- 2011)
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:

National Finalist, Blavatnik Awards for Young Scientists, 2016
Finalist, LA Times Book Award (for *How to Clone a Mammoth*), 2016
AAAS/Subaru SB&F Prize for Excellence in Science Books (for *How to Clone a Mammoth*), 2016
Packard Fellow, 2010
PopTech Science and Public Leadership Fellow, 2010
National Geographic Emerging Explorer, 2010
MacArthur Fellow, 2009
Searle Scholar, 2009
Visiting Fellow, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, 2007
Smithsonian Young Innovator, 2007
University Research Fellow, The Royal Society, 2006
Research Fellow, Balliol College, University of Oxford, 2002-2007
Rhodes Scholar, 1999

Professional Activities:

Associate Editor, *Journal of Heredity* (2017-present).
Advisory Board, Revive & Restore
American Genetics Association, Council (2016-2019)
Member: Contamination Control and Planetary Protection Working Group; Mars 2020; NASA. (2015-present)
Organizing Committee: Advances in Genome Biology and Technology meeting (2015-present)
Editorial Board, *STAR: Science and Technology of Archaeological Research*; <http://www.maneyonline.com/loi/sta> (2014-present)
Editorial Board, *PaleoAmerica*; <http://www.maneyonline.com/loi/pal> (2014-present).

Executive Committee Member: *Genome10K/Vertebrate Genome Project*. <https://genome10k.soe.ucsc.edu/> (2013-present)

Member: Public Interfaces of the Life Sciences Roundtable, The National Academies (2013-2015)

Panelist: *Molecular Evolution and Genomics* funding panel, Genes and Genome Systems Cluster, Division of Molecular and Cellular Biosciences, The National Science Foundation. 2012

Panelist: *Public Interfaces of Science*, The National Academies. (2010).

US Co-Chair: *Indonesian-American Kavli Frontiers of Science*, The National Academy of Science (2010).

US Session Chair: *German-American Kavli Frontiers of Science*, The National Academy of Science (2009).

Associate Editor, *Molecular Biology and Evolution*; <http://mbe.oxfordjournals.org/> (2007-present).

Reviewer for >30 peer-review journals including *Science*, *Nature*, *PLoS Biology*, *Current Biology*, *PNAS*, *Proc Roy Soc B*, *Biology Letters*, *Molecular Ecology*.

Public Understanding of Science: I am and have been involved with several organizations to promote the public understanding of science. More information and upcoming events can be found on my website and in the "Seminars" section of this document.

Professional Memberships:

American Association for the Advancement of Science

Society for Molecular Biology and Evolution

American Genetics Association

Canadian Quaternary Association

Society for Vertebrate Paleontology

Research Interests:

Molecular evolution; Genome evolution; Viral evolution; The interface of genomics and climate change; Ancient DNA; Paleontology; Human evolution, Extinction and speciation; Reconstructing demographic changes through time; Science communication

Teaching:

BIOE 137 (UCSC): *Molecular Ecology*.

BIOE 153A, B, C, *Arctic Ecology and Scientific Communication field quarter*, a field course to be taught every other year beginning summer 2018.

Biology 110 (PSU) *Basic Concepts and Biodiversity*. I co-taught this large (~720 student) course.

Biology 439 (PSU) *Practical Bioinformatics*. I have developed a combined lecture/practical course to teach students current methods for the analysis of molecular sequence data.

International Bioinformatics Workshop on Virus Evolution and Molecular Epidemiology. I am part of the core faculty for this annual, week-long workshop in which students are introduced to the latest phylogenetic and genealogic methods to analyze molecular data from viruses.

Ethics in Genetics (Oxford University). I developed and taught an intensive four-week course in which students were challenged to tackle ethical dilemmas arising from modern scientific advances.

Biomolecular Evolution (Oxford University). I developed and taught a 3-week lecture/discussion course as part of the MSc in Archaeological Science, in which students are introduced to the basic concepts and application of ancient DNA.

Supervision:

My laboratory currently consists of seven PhD students (Nathan Schaffer, Natasha Dudek, Sidra Houssain, Alisa Vershinina, Sabrina Shirazi, Josh Kapp, Nevé Baker) four Postdoctoral Research

Associates (Megan Supple, Gemma Murray, Ruth Nichols, Darko Cotoras), four undergraduate researchers and three technicians.

Past graduate students:

Ben Novak (MSc, UCSC, 2016; current: graduate student, Canberra University).

James Cahill (PhD, UCSC, 2016; Current: Postdoc, Jarvis lab, Rockefeller University)

James Haile (PhD, Oxford, 2006; Current: Postdoctoral Associate, Oxford University ancient DNA center).

Gabrielle Harrison (PhD, Oxford, 2007; Current: Postdoctoral Associate, Institute for Emerging Infections, Oxford University)

Brandon Letts (PhD, PSU, 2011; Current: FBI forensic scientist)

Logan Kistler (PhD, PSU, 2012, Current: Assistant Professor, University of Warwick)

Conrad Stack 9PhD, PSU, 2013, Current: Research scientist, Mars, Inc.)

Kristine Korzow-Richter (PhD, PSU, 2014, current: ERC fellow, University of York).

Past postdoctoral scholars:

Peter Heintzman (current: Tromsø University Museum, Norway)

André Elias Rodrigues Soares (current: Laboratório Nacional de Computação Científica, LNCC, Brasil)

Dan Chang (Current: Senior Senior Scientist, Merck Research Laboratories)

Simon Y. W. Ho (Current: Associate Professor, Sydney University).

Tara Fulton (Current: Canadian Wildlife Service).

Mathias Stiller (Current: German Cancer Consortium).

Andrew Clack (Current: U.S. Army forensic scientist).

Ryan W. Norris (current: Faculty, Lock Haven University).

Undergraduate Research

At present, we have five undergraduate researchers working in the lab. We have supervised three REU students and two MEXUS students.

At PSU, five undergraduate Honors theses were completed under my supervision.

Publication List

In Press:

- (1) Kirillova IV, Chernova OF, Kukarsih VV, Shapiro B, van der Plischt J, Shidlovskiy FK, Heintzman PD, van Kolfschoten T, Zazina OG. On the discovery of the skull of *Stephanorhinus kirchbergensis* (Jager, 1839) above the Arctic Circle. *Quaternary Research*.
- (2) Zazula GD, Hall E, Hare PG, Thomas C, Matthewes R, La Farge C, Martel AL, Heintzman PD, Shapiro B. 2017. A partial steppe bison skeleton and middle Holocene paleoenvironmental from the Versleuce Meadows, Whitehorse, Yukon, Canada. *Canadian Journal of Earth Sciences*
- (3) Maschenko EN, Potapova OR, Vershinina A, Shapiro B, Streletskaya IR, Vasilev AA, Oblogov GE, Kharlamova AS, van der Plicht J, Tikhonov AN, Serdyuk NV, Tarasenko KK. The Zhenya Mammoth (*Mammuthis primigenius* (Blum.)): taphonomy, geology, age, morphology and ancient DNA of a 48,000 year old frozen mummy from Western Taymyr, Russia. *Quaternary International*.

Journal articles:

- (4) vonHoldt BM, Cahill JA, Gronau I, Shapiro B, Wall J, Wayne RK. 2017. Response to *Whole genome data do not support recent hybrid origins of red wolves and eastern wolves*. *Science Advances* 3: e1701233
- (5) Meyer M, Palkopoulou E, Baleka S, Stiller M, Penkman K, Alt KW, Ishida Y, Mania D, Mallick S, Meijer T, Meller T, Nagel S, Nickel B, Ostritz S, Roca AL, Rohland N, Schauer K, Schüler T, Reich D, Shapiro B, Hofreiter M. 2017. Nuclear and mitochondrial genome sequences of the Middle Pleistocene Eurasian straight-tusked elephant rewrite elephant evolutionary history. *eLife* 6: e23413.
- (6) Wang Y, Heintzman P, Newsom L, Bigelow N, Wooller M, Shapiro B, Williams J. 2017. The southern coastal Beringian land bridge: cryptic refugium or pseudo refugium for woody plants during the Last Glacial Maximum? *Journal of Biogeography* 44:1559-1571
- (7) Froese DG, Stiller M, Heintzman PD, Reyes AV, Zazula GD, Soares AER, Meyer M, Hall E, Jensen BKL, Arnold L, MacPhee RDE, Shapiro B. 2017. New fossil and genomic evidence constrains the timing of bison arrival in North America. *Proc Natl Acad Sci USA*. 114:3457-3462.
- (8) Schaefer NK, Shapiro B, Green RE. AD-LIBS: 2017. Inferring ancestry across hybrid genomes using low-coverage sequence data. *BMC Bioinformatics*. 18:203.
- (9) Chang D*, Knapp M*, Enk J*, Lippold S, Kircher M, Lister A, MacPhee RDE, Widga C, Czechowski P, Sommer R, Hodges E, Stümpel N, Barnes I, Dalén L, Derevianko A, Germonpré M, Hillebrand-Voiculescu A, Constantin S, Kuznetsova T, Mol D, Rathgeber R, Rosendahl W, Tikhonov AN, Willerslev E, Hannon G, Lalueza-Fox C, Joger U, Poinar H, Hofreiter M, Shapiro B. 2017. The evolutionary and phylogeographic history of woolly mammoths: a comprehensive mitogenomic analysis. *Scientific Reports* 7:44585
- (10) Węcek K, Hartmann S, Paijmans JLA, Taron U, Xenikoudakis G, Cahill JA, Heintzman PD, Shapiro B, Baryshnikov G, Bunevich AN, Crees JJ, Dobosz R, Manaserian N, Okarma H, Tokarska M, Turvey ST, Wójcik JM, Żyła W, Szymura JM, Hofreiter M, Barlow A. 2017. Complex admixture preceded and followed the extinction of wisent in the wild. *Molecular Biology and Evolution* 34: 598-612.
- (11) Rearden J, Ankeny RA, Bangham J, Darling K, Hilgartner S, Maxson Jones K, Shapiro B, Stevens H, and the Genomic Open workshop group. 2016. Bermuda 2.0: Reflections from Santa Cruz. *GigaScience* 5:1-4.
- (12) Soares AER, Novak B, Haile J, Fjeldså J, Gilbert MTP, Poinar H, Church G, Shapiro B. 2016. Complete mitochondrial genomes of living and extinct pigeons revise the timing of the columbiform radiation. *BMC Evolutionary Biology* 16: 1-9.
- (13) Soubrier J, Gower G, Chen K, Richards S, Llamas B, Mitchell KJ, [35 authors], Shapiro B, Cooper

- A. 2016. Early cave art and ancient DNA record the origin of European bison. *Nature Communications* 7:13158.
- (14) vonHoldt BM, Cahill JA, Fan Z, Gronau I, Robinson J, Pollinger JP, Shapiro B, Wall J, Wayne RK. 2016. Whole-genome sequence analysis shows that two endemic species of North American wolf are admixtures of the coyote and gray wolf. *Science Advances* 2: e150175.
 - (15) Shapiro B. 2016. Pathways to de-extinction: How close can we get to resurrection of an extinct species? *Functional Ecology*. 10.1111/1365-2435.12705 <http://onlinelibrary.wiley.com/doi/10.1111/1365-2435.12705/full>
 - (16) Heintzman PD, Froese DG, Ives JW, Soares AER, Zazula GD, Letts B, Andrews TD, Driver JC, Hall E, Hare G, Jass CN, MacKay G, Southon JR, Stiller M, Woywitka R, Suchard MA, Shapiro B. 2016. Bison phylogeography constrains dispersal and viability of the 'Ice Free Corridor' in western Canada. *Proc Natl Acad Sci USA*. Proc 113: 8057-8063. <http://www.pnas.org/content/113/29/8057.full?sid=7b4833d6-a9ea-4887-8123-7ef48f5c26f9>
 - (17) Graham RW*, Belmecheri S, Choy K, Cullerton B, Davies LH, Froese D, Heintzman PD, Hritz C, Kapp JD, Newsom L, Rawcliffe R, Saulnier-Talbot E, Shapiro B, Wang Y, Williams JW, Wooller MJ. 2016. Declining freshwater availability caused the extinction of the last North American mammoth. *remaining authors are in alphabetical order. *Proc Natl Acad Sci USA* 113: 9310-9314 <http://www.pnas.org/content/113/33/9310.full>
 - (18) Schaefer NK, Shapiro B, Green RE. 2016. Detecting hybridization using ancient DNA. *Molecular Ecology* 25: 2398-2412.
 - (19) Cahill JA, Soares AER, Green RE, Shapiro B. 2016. Inferring species divergence times using Pairwise Sequential Markovian Coalescent (PSMC) modeling and low coverage genomic data. *Phil Trans Roy Soc B* 371: 20150138.
 - (20) Enk J, Devault A, Widga C, Saunders J, Szpak P, Southon JR, Rouillard J-M, Shapiro B, Golding B, Zazula GD, Froese DG, Fisher D, MacPhee RD, Poinar H. 2016. *Mammuthus* population dynamics in Late Pleistocene North America: Divergence, phylogeography and introgression. *Frontiers in Ecology and Evolution* 4:00042. DOI=10.3389/fevo.2016.00042.
 - (21) Chernova O, Kirillova I, Shapiro B, Shidlovskiy F, Soares, AER, Levchenko V, Bertuch F. 2016. Morphological and genetic identification and isotopic determinations of the hair of a cave lion from the Malyi Anyui River (Chukotka, Russia). *Quaternary Science Reviews* 142: 61-73.
 - (22) Simpson JP, Penkman KEH, Demarchi D, Koon H, Collins MJ, Thomas-Oates J, Shapiro B, Stark M, Wilson J. 2016. The effects of demineralisation and sampling point variability on the measurement of glutamine diminution in type I collagen extracted from bone. *Journal of Archaeological Science* 69: 29-38.
 - (23) Chang D, Shapiro B. 2016. Using ancient DNA and coalescent-based methods to infer extinction. *Biology Letters* 12: 20150822.
 - (24) Tong W, Shapiro B, Rubenstein DI. 2015. Genetic relatedness in two-tiered plains zebra societies suggests that females choose to associate with kin. *Behavior* 152: 2059-2078.
 - (25) Rijdsdijk KR, Hume JP, De Louw, PGB, Meijer HJM, Janoo A, De Boer EJ, [18 authors], Shapiro B, [13 authors]. 2015. A review of the dodo and its ecosystem: insights from a vertebrate concentration Lagerstätte in Mauritius. *Journal of Vertebrate Paleontology* 35 (6, Supplement): 3-20.
 - (26) Ho SYW, Duchene S, Molak M, Shapiro B. 2015. Time-dependent estimates of molecular evolutionary rates: evidence and causes. *Molecular Ecology* 24: 6007-6012.
 - (27) Vohr SH, Buen Abad Najjar CF, Shapiro B, Green RE. 2015. A method for positive forensic identification of samples from extremely low coverage. *BMC Genomics* 16:1034 DOI: 10.1186/s12864-015-2241-6.
 - (28) Mann DH, Groves P, Reanier RE, Gaglioti BV, Kunz ML, Shapiro B. 2015. Life and extinction of megafauna in the ice-age Arctic. *Proc. Natl. Acad. Sci. USA* 112: 14301-14306.
 - (29) Shapiro B. 2015. Mammoth 2.0: Will genome engineering resurrect extinct species? *Genome Biology* 16:228.
 - (30) Heintzman PD, Soares AER, Chang D, Shapiro B. 2015. Paleogenomics. *Reviews in Cell Biology*

and *Molecular Medicine* 1: 243-267.

- (31) Kirillova IV, Zamina OG, Chernova OF, Lapteva EG, Trofimova SS, Lebedev VS, Tiunov AV, Soares AER, Shidlovskiy FK, Shapiro B. 2015. An ancient bison from the mouth of the Rauchua River, Chukotka, Russia. *Quaternary Research* 84: 232-245.
- (32) Koepfli K-P, Pollinger J, Godinho R, Robinson J, Lea A, Hendricks S, Schweitzer RM, Thalmann O, Silva P, Fan Z, Yurchenko AA, Dobrynin P, Makunin A, Cahill JA, Shapiro B, Álvares F, Brito JC, Geffen E, Leonard JA, Helgen KM, Johnson WE, O'Brien SJ, Van Valkenburgh B, Wayne RK. 2015. Genome-wide evidence reveals that African and Eurasian Golden Jackals are distinct species. *Current Biology* 17: 2158-2165.
- (33) Heintzman PD, Zazula GD, Cahill JA, MacPhee RDE, Shapiro B. 2015. Genomic data from extinct North American *Camelops* revises camel evolutionary history. *Molecular Biology and Evolution* 32: 2433-2440.
- (34) Seguin-Orlando A, Gamba C, DerSarkissian C, Ermini L, Louvel G, Boulygina E, Sokolov A, Nedoluzhko A, Lorenzen E, Lopez P, McDonald HG, Scott E, Tikhonov A, Stafford TW Jr, Shapiro B, Willerslev E, Prokhortchouk E, Orlando L. 2015. Pros and cons of methylation-based enrichment methods for ancient DNA. *Scientific Reports* 5: 11826.
- (35) Wooller M, Gaglioti B, Fulton TL, Shapiro B. 2015. Post-glacial dispersal of northern pike (*Esox cf. lucius*) in Eastern Beringia inferred using radiocarbon and ancient-DNA results from an 8,800 year old fish skull preserved in Quartz Lake, interior Alaska. *Quaternary Science Reviews* 120: 118-125.
- (36) Seguin-Orlando A, Hoover C, Vasiliev S, Ovodov ND, Shapiro B, Cooper A, Rubin E, Willerslev E, Orlando L. 2015. Amplification bias in TruSeq DNA libraries uncovers ancient methylation signatures. *Science and Technology of Archaeological Research* 1: 112054892315Y. 0000000005.
- (37) Cahill JA, Green RE, Kistler L, Salamzade R, Ersmark E, Fulton TL, Stiller M, Shapiro B. 2015. Genomic evidence of geographically widespread effect of gene flow from polar bears into brown bears. *Molecular Ecology* 24: 1205-1217.
- (38) Alter SE, Meyer M, Post K, Czechowski P, Gravlund P, Gaines C, Rosenbaum HC, Turvey ST van der Plicht H, Shapiro B, Hofreiter M. 2015. Climate impacts on trans-ocean dispersal and habitat in gray whales from the Pleistocene to the year 2100. *Molecular Ecology* 24: 1510-1522.
- (39) Koepfli KP- Paten B, The Genome 10K Community of Scientists*, O'Brien SJ. 2015. The Genome 10K Project: A way forward. *Annual Review of Animal Biosciences* 3: 57-111.
- (40) Shapiro B, Graham RD, Letts B. 2015. A revised evolutionary history of armadillos (*Dasypus*) in North America based on ancient DNA. *Boreas* 44:14-23.
- (41) Molak M, Suchard MA, Ho SYW, Beilman D, Shapiro B. 2015. Empirical calibrated radiocarbon sampler: a tool for incorporating radiocarbon-date and calibration error into Bayesian phylogenetic analyses of ancient DNA. *Molecular Ecology Resources* 15: 81-86
- (42) Schubert M*, Jónsson H*, Chang D*, Der Sarkissian C, Emini Km Ginolhac A, Albrechtsen A, Dupanloup Im Foucal A, Petersen B, Raghavan M, Seguin-Orlando A, Korneliusen TF, Velasquez AMV, Stenderup J, Hoover CA, Rubin CJ, Alfarhan AM, Alquaraishi SA, Al-Rasheid KAS, MacHugh DE, Kalbfleish T, MacLeod JN, Rubin EM, Sichert-Ponten T, Andersson L, Hofreiter M, Marques-Bonet T, Gilbert MTP, Nielsen R, Excoffier L, Willerslev E, Shapiro B, Orlando L. 2014. Prehistoric horse genomes reveal the genetic foundation and cost of domestication. *Proc Natl Acad Sci USA* 111: E5661-E5669.
- (43) Jarvis ED, Mirarab S, and the Avian Phylogenomics Consortium [103 additional authors]. 2014. Whole genome analyses resolve early branches in the tree of life of modern birds. *Science* 346: 1320-1331.
- (44) Ng TFF, Zhou Y, Chen L-F, Shapiro B, Stiller M, Heintzman PD, Varsani A, Kondov NO, Wong W, Deng X, Andrews TD, Moorman BJ, Meulendyk R, MacJay G, Gilbertson RL, Delwart E. 2014. Preservation of viral genomes in 700-year-old caribou feces from a subarctic ice patch. *Proc Natl Acad Sci USA* 111:16842-16847.

- (45) Johnson KR, Miller IM, Pigati JS, Ager T, Anderson S, Carrara P, [9 authors], Shapiro B, [43 authors] Troll, C. 2014. Introduction to the Snowmastodon Project Special Volume The Snowmastodon Project. *Quaternary Research*, 82(3), 473-476.
- (46) Kistler L, Montenegro A, Smith BD, Gifford JA, Green RE, Newsom LA, Shapiro B. 2014. Transoceanic drift and the domestication of African bottle gourds in the Americas. *Proc Natl Acad Sci USA*. 111:2937-2941.
- (47) Shapiro B, Hofreiter M. 2014. A paleogenomic perspective on evolution and gene function: New insights from ancient DNA (invited review). *Science* 343: 1236573.
- (48) Horn S, Prost S, Stiller M, Makowiecki D, Kusnetsova T, Benecke N, Pucher E, Hufthammer AK, Schouwenburg C, Shapiro B, Hofreiter M. 2014. Ancient mitochondrial DNA and the genetic history of Eurasian beavers *Castor fiber*. *Molecular Ecology* 23: 1717-1729.
- (49) Der Sarkissian C, Emini L, Jónsson H, Alekseev A, Crubézy E, Shapiro B, Orlando L. 2014. Shotgun profiling of fossil remains. *Molecular Ecology* 23: 1780-1798.
- (50) Barnett R, Yamaguchi N, Shapiro B, Ho, SYW, Barnes I, Burger J, Sabin R, Werdelin L, Cuisin J, Larson G. 2014. Revealing the maternal demographic history of *Panthera leo* using ancient DNA and a spatially explicit genealogical analysis. *BMC Evolutionary Biology* 14: 80.
- (51) Harington CR, Cournoyer M, Chartier M, Fulton TL, Shapiro B. 2014. Brown bear (*Ursus arctos*) (9880±35 BP) from Late-glacial Champlain Sea deposits of Saint-Nicolas, Québec, Canada, and the dispersal history of bears. *Canadian Journal of Zoology* 51: 527-535.
- (52) Shapiro B, Ho SYW. 2014. Ancient hyaenas highlight the old problem of estimating evolutionary rates (Invited perspective). *Molecular Ecology* 23:499-501.
- (53) Thalmann O, Shapiro B, Schuenemann VJ, Sawyer SK, Greenfield DL, Germonpre MB, [23 others] Wayne RK. 2013. Complete mitochondrial genomes of ancient canids suggests a European origin of domestic dogs. *Science*. 342: 871-874.
- (54) Orlando L, Finolhac A, Zhang G, Froese D, [49 authors], Shapiro B, Jun W, Willerslev E. 2013. Recalibrating *Equus* evolution using the genome sequence of an early Middle Pleistocene horse. *Nature* 499: 74-78.
- (55) Green RE, Shapiro B. Human evolution: turning back the clock. 2013. *Current Biology* 23:R286-288.
- (56) Fulton TL, Norris RW, Graham RE, Semken HA Jr, Shapiro B. 2013. Ancient DNA supports southern survival of Richardson's collared lemming (*Dicrostonyx richardsoni*) during the Last Glacial Maximum. *Molecular Ecology* 22:2540-2548.
- (57) Cahill JA, Green RE, Fulton TL, Stiller M, Jay F, Ovsyanikov N, Salamzade R, St John J, Stirling I, Slatkin M, Shapiro B. 2013. Genomic evidence for island population conversion resolves conflicting theories of polar bear evolution. *PLoS Genetics* 9: e1003345.
- (58) Vilstrup JT, Sengouin-Orlando Am Stiller M, Ginolhac A, Raghavan M, Nielsen SCA, Weinstock J Friese D, Vasiliev SK, Ovodov ND, Clary J, Helgen KM, Fleischer RC, Cooper A, Shapiro B, Orlando L. 2013. Mitochondrial phylogenomics of modern and ancient equids. *PLoS ONE* 8: e55950.
- (59) Gill MS, Lemey P, Faria NR, Rambaut A, Shapiro B, Suchard M. 2013. Improving Bayesian population dynamics inference: a coalescent-based model for multiple loci. *Molecular Biology and Evolution* 30: 713-724.
- (60) Molak M, Lorenzen ED, Shapiro B, Ho SYW. 2013. Phylogenetic estimation of timescales using ancient DNA: the effects of temporal sampling scheme and uncertainty in sample ages. *Molecular Biology and Evolution* 30: 253-262.
- (61) Ginolhac A, Vilstrup J, Stenderup J, Rasmussen M, Stiller M, Shapiro B, Zazula G, Froese D, Steinmann KE, Thompson JD, AL-Rasheid KAS, Gilbert MTP, Willerslev E, Orlando L. 2012. Improving the performance of true single-molecule sequencing for ancient DNA. *BMC Genomics* 13:177.
- (62) Fischer A, Shapiro B, Muriuki C, Heller M, Schnee C, Bongcam-Rudloff E, Frey J, Jores J. 2012. The origin of the '*Mycoplasma mycoides* cluster' coincides with domestication of ruminants. *PLoS ONE* 7:e36150.

- (63) Widga C, Fulton TL, Martin LD, Shapiro B. 2012. *Homotherium* and *Cervalces* from the Great Lakes region, USA: geochronology, morphology and ancient DNA. *Boreas* 41: 546-556.
- (64) Dalén L, Orlando L, Shapiro B, Durling MB, Quam R, Gilbert MTP, Fernández-Lomana JCD, Willerslev E, Arsuaga JL, Götherström 2012. A. Partial genetic turnover in Neandertal: continuity in the east and population replacement in the west. *Molecular Biology and Evolution* 29: 1893-1897.
- (65) Letts B, Shapiro B. 2012. Case study: ancient DNA recovered from Pleistocene-age remains of a Florida armadillo. *Methods in Molecular Biology* 840: 87-92.
- (66) Fulton TL, Wagner SM, Shapiro B. 2012. Case study: recovery of ancient nuclear DNA from toe pads of the extinct passenger pigeon. *Methods in Molecular Biology* 840: 29-35.
- (67) MacDonald GM, Beilman DW, Kuzmin YV, Orlova LA, Kremenetski KV, Shapiro B, Wayne RK, Van Valkenburgh B. 2012. Pattern of extinction of the woolly mammoth in Beringia. *Nature Communications* 3: 893.
- (68) Letts B, Fulton TL, Stiller M, Andrews T, MacKay G, Popko R, Shapiro B. 2012. Ancient DNA reveals genetic continuity in woodland caribou of the Central Mackenzie Mountains, Northwest Territories, Canada. *Arctic* 65, Suppl 1: 80-94.
- (69) Fulton TL, Wagner SM (PSU undergrad), Fisher C, Shapiro B. 2012. Nuclear DNA from the extinct passenger pigeon (*Ectopistes migratorius*) confirms its phylogenetic placement within the Columbinae. *Annals of Anatomy* 194: 52-57.
- (70) Fulton T, Letts B, Shapiro B. 2012. Multiple losses of flight and recent speciation in steamer ducks. *Proceedings of the Royal Society B* 279: 2339-2346.
- (71) Higham T, Compton T, Stringer C, Jacobi R, Shapiro B, Trinkaus E, Chandler B, Gröning F, Collins C, Hillson S, O'Higgins P, Fagan M. 2011. The earliest evidence for anatomically modern humans in northwestern Europe. *Nature* 479: 521-524.
- (72) Orlando L, Ginolhac A, Raghavan M, Vilstrup J, Rasmussen M, Magnussen K, Steinmann K, Kapranov P, Thompson JF, Shapiro B, Zazula G, Froese D, Hofreiter M, Al-Rasheid KAS, Mundy J, Gilbert MTP, Willerslev E. 2011. Single-molecule ancient DNA sequencing of a Pleistocene horse bone. *Genome Research* 21: 1705-1719.
- (73) Lorenzen ED, Nogues-Bravo D, Orlando L, Weinstock J, Binladen J, Marske KA, 52 additional authors, Shapiro B, Rahbek C, Willerslev E. 2011. Species-specific responses of Late Quaternary megafauna to climate and humans. *Nature* 479: 359-364.
- (74) Edwards CJE, Suchard MA, Lemey P, Welch JJ, Barnes I, Fulton TL, Barnett R, O'Connell TC, Coxon P, Monaghan N, Valdiosera C, Lorenzen ED, Willerslev E, Baryshnikov GF, Rambaut A, Thomas MG, Bradley DG, Shapiro B. 2011. Ancient hybridization and a recent Irish origin for the modern polar bear matriline. *Current Biology* 21: 1-8.
- (75) Kistler L, Shapiro B. 2011. Ancient DNA confirms a local origin of domesticated chenopod in Eastern North America. *J. Arch. Sci.* 38: 3459-3554.
- (76) Lippold S, Knapp M, Kuznetsova T, Leonard JA, Benecke N, Ludwig A, Rasmussen M, Weinstock J, Willerslev E, Shapiro B, Hofreiter M. 2011. Discovery of lost diversity of paternal horse lineages using ancient DNA. *Nature Comm.* 2:450.
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A short video take on what I do:

http://poptech.org/popcasts/quick_takes_beth_shapiro

And how I “live curious”:

<http://video.nationalgeographic.com/video/specials/in-the-field-specials/curiosity-beth-shapiro/>

Longer talks/seminars

TEDxDeExtinction:

Ancient DNA: What it is, and what it could be
National Geographic Society, Washington D.C.

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Pop!Tech:

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