

# Daniel R. Green, PhD

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Department of Human Evolutionary Biology  
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## Education

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- Ph.D.** May 2017  
*Harvard University*, Department of Human Evolutionary Biology  
Laboratory of Tanya M. Smith  
Dissertation Title: *Reconstructing oxygen isotope seasonality in large herbivores through mineralization modeling, experimentation and optimization*
- A.M.** May 2012  
*Harvard University*, Department of Human Evolutionary Biology
- B.S.** May 2008  
*University of Michigan*  
Majors in Anthropology–Zoology, History, French and Francophone Studies  
Minor in Biology

## Appointments

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- Lecturer** Jun 2019 – present  
**College Fellow** Jun 2020 – present  
**Associate Concentration Advisor** Jun 2019 – May 2020  
*Harvard University*  
Department of Human Evolutionary Biology
- Research Associate** Mar 2019 – present  
*Turkana Basin Institute*  
*National Museums of Kenya*
- NIH Ruth L. Kirschstein T90 Postdoctoral Research Fellow** Jan 2017 – Jun 2019  
*The Forsyth Institute, Harvard School of Dental Medicine*  
Mineralized Tissue Biology
- Research Associate** Jan 2017 – Jun 2019  
*Harvard University*  
Department of Human Evolutionary Biology
- Graduate Research Fellow** Sep 2009 – Dec 2016  
*Harvard University*  
Department of Human Evolutionary Biology  
Laboratory of Tanya M. Smith
- Research Assistant** Jan 2006 – May 2006  
*University of Michigan*  
Department of Anthropology  
Laboratory of Milford Wolpoff and William Sanders

## Research Assistant

University of Michigan  
Department of Ecology and Evolutionary Biology  
Laboratory of Jianzhi Zhang

Oct 2003 – May 2005

## Publications

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- Merceron G, Berlioz E, Vonhof H, **Green DR**, Garel M, Noûs C, Tütken T (2020) Tooth tales told by dental diet proxies: an alpine community of sympatric ruminants as a model to decipher the ecology of fossil fauna. *Palaeogeography, Palaeoclimatology, Palaeoecology*. In Press.
- Stiffler CA, Jakes J, North JD, **Green DR**, Weaver JC, Gilbert PU (2020) Crystal misorientation correlates with hardness in tooth enamels. *Acta Biomaterialia*. In Press.
- Green DR**, Hardt M, Schulte F, Lee K-H, Pugach MK, Bidlack FB (2019) Mapping the Tooth Enamel Proteome and Amelogenin Phosphorylation Onto Mineralizing Porcine Tooth Crowns. *Frontiers in Physiology* 10:925.
- Goodson JM, Hardt M, Hartman M-L, Alqaderi H, **Green DR**, Tavares M, Mutawa A-L, Ariga J, Soparkar P, Behbehani J, Behbehani K (2019) Salivary N1-Methyl-2-pyridone-5-carboxamide, a biomarker for uranium uptake, in Kuwaiti children exhibiting exceptional weight gain. *Frontiers in Endocrinology* 10:382.
- Smith TM,\* Austin C\*, **Green DR\***, Joannes-Boyau R\*, Bailey S, Dumitriu D, Fallon S, Grün R, James HF, Moncel M-H, Williams IS, Wood R, Arora M (2018) Wintertime stress, nursing, and lead exposure in Neanderthal children. *Science Advances* 4: eaau9483 \*These authors contributed equally to this work.
- Green DR**, Smith TM, Green GM, Bidlack FB, Tafforeau P, Colman AS (2018) Quantitative reconstruction of seasonality from stable isotopes in teeth. *Geochimica et Cosmochimica Acta* 235:483–504.
- Green DR**, Olack G, Colman AS (2018) Determinants of blood water  $\delta^{18}\text{O}$  variation in a population of experimental sheep: implications for paleoclimate reconstruction. *Chemical Geology* 485:32-43.
- Green DR**, Green GM, Bidlack FB, Colman AS, Tafforeau P, Smith TM (2017) Synchrotron imaging and Markov Chain Monte Carlo reveal tooth mineralization patterns. *PLoS ONE* 12(10): e0186391.
- Cho S, Huang ZY, **Green DR**, Smith DR, Zhang J (2006) Balancing selection generates trans-species polymorphisms at the complementary sex-determination locus of honey bees. *Genome Research* 16:1366-1375.

## Publications in Preparation

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- Green DR**, Cote S, Dirks W, Williams IS, Smith TM (*in preparation*) High resolution paleoenvironmental records from East African fossil apes.
- Smith TM, Austin C, Cook L, Dirks W, **Green DR**, Arora M (*in preparation*) Biological rhythms and chemical records in teeth reveal juvenile diet, health, and neurotoxicant exposures retrospectively
- Green DR**, Olack G, Colman AS, Prat S, Lewis J, Brugal J-P, Harmand S, Leakey M, Smith TM (*in preparation*) Plio-Pleistocene seasonality at west Lake Turkana. For submission to the *American Journal of Physical Anthropology*.

**Green DR**, Olack G, Colman AS (*in preparation*) Phosphate-water  $\delta^{18}\text{O}$  offset in large herbivores for paleoclimate reconstruction. For submission to *Geochimica et Cosmochimica Acta*.

Pugach MK, Jang JY, **Green DR**, Depalle B, Bidlack FB (*in preparation*) Investigating potential roles of ameloblastin and enamelin in enamel development.

## Research Funding

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<b>Australian Academy of Science Regional Collaborations Programme</b> Jointly awarded with Tanya Smith, Ian Williams and Hallie Buckley, and Tanya Smith as lead PI. Grant total \$147,340	2019 – 2020
<b>American School of Prehistoric Research</b> <i>Systematics of east African fossil herbivore dentitions through neural network-based image processing</i> Awarded \$3,500	2019
<b>National Institutes of Health Postdoctoral Training Fellowship</b> Forsyth Institute Internal Competitive T90 Application <i>Inferring toxicant exposure timing and magnitude from human deciduous teeth</i> Awarded \$144,000	2018 – 2019
<b>Forsyth Institute Pilot Grant</b> <i>Inferring toxin exposure timing and magnitude from deciduous teeth</i> Awarded \$7,830	2017 – 2019
<b>Leakey Foundation General Grant</b> <i>Plio-Pleistocene Seasonal Precipitation through isotopes in Bovid molars, West Turkana</i> Awarded \$12,000	2014 – 2017
<b>Wenner-Gren Foundation Dissertation Grant</b> <i>Experimental Reconstruction of Seasonal Rainfall for Paleoclimate Research</i> Awarded \$18,810	2014 – 2016
<b>National Science Foundation Doctoral Dissertation Improvement Grant</b> <i>Experimental Determination of Tooth Mineralization Patterns in Ungulates for Application to Paleoseasonality Reconstruction</i> Awarded \$19,855	2012 – 2014
<b>National Science Foundation Graduate Research Fellowship</b> <i>A New Isotopic Sampling Method Combining Microtomography and Histology: Signal Distortion through Sampling Technique and Diagenesis</i> Awarded \$90,000	2011 – 2014
<b>Harvard University Committee on African Studies Summer Research Grant</b> <i>Plio-Pleistocene Seasonal Precipitation through isotopes in Bovid molars, West Turkana</i> Awarded \$5,000	2012
<b>European Synchrotron Radiation Facility Research Award</b> <i>Determination of Enamel Mineralization Pattern by Scans of Successive Developmental Stages With Application for Study of Paleoecology</i> Awarded: 3 days beam time, est. \$10,000/day	2012

## Abstracts and Presentations

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- Green DR**, Smith TM, Arora M, Austin C (2020) Trace metal compositions in forming teeth reflect both mineralization and diet. *The Society of Vertebrate Paleontology 80th Annual Meeting*, Virtual, October 12-16, 2020.
- Merceron G, Berlioz E, Vonhof H, **Green DR**, Garel M, Noûs C, Tütken T (2020) Ground Truthing Dental Ecological Proxies On A Modern Alpine Community Of Sympatric Ruminants. *The Society of Vertebrate Paleontology 80th Annual Meeting*, Virtual, October 12-16, 2020.
- Green DR**, Cote S, Dirks W, Reid DJ, Williams IS, Smith TM (2020) Seasonal Isotope Ecology in the East African Miocene Ape *Afropithecus*. *89th Annual Meeting of the American Association of Physical Anthropologists*, Los Angeles, CA and online, April 15-18, 2020.
- Green DR**, Cote S, Williams IS, Smith TM (2019) High resolution paleoenvironmental records from East African fossil apes. *20th International Union for Quaternary Research Congress*, Dublin, Ireland, July 25-31, 2019.
- Smith TM, **Green DR**, Williams IS (2019) Weekly oxygen isotope measurements in teeth reveal environmental variation. *20th International Union for Quaternary Research Congress*, Dublin, Ireland, July 25-31, 2019.
- Pugach MK, Jang JY, **Green DR**, Depalle B, Bidlack FB (2019) Investigating potential roles of ameloblastin and enamelin in enamel development. *The 13th International Conferences on the Chemistry and Biology of Mineralized Tissues*, Montebello, Quebec, October 20-25, 2019.
- Smith TM, Austin C, **Green DR**, Joannes-Boyau R, Bailey S, Dumitriu D, Fallon S, Grün R, James HF, Moncel M-H, Williams IS, Wood R, Arora M (2019) Tales teeth tell: wintertime stress, nursing, and lead exposure in Neanderthal children. *88th Annual Meeting of the American Association of Physical Anthropologists*, Cleveland, OH, March 27-30, 2019.
- Green DR**, Hardt M, Schulte F, Lee K-H, Pugach MK, Bidlack FB (2018) Mapping amelogenesis proteins in an expanded enamel proteome. *Gordon Research Conference on Biomineralization*, New London, NH (poster).
- Depalle B, Pugach MK, Jang JY, **Green DR**, Yaskell T, Bidlack FB (2018) The Role of Amelogenin for pH Buffering during Amelogenesis. *Gordon Research Conference on Biomineralization*, New London, NH.
- Smith TM, **Green DR**, Austin C, Arora M, Grün R, Williams I (2018) Environmental variation and nursing history revealed by sensitive high resolution ion microprobe (SHRIMP) analyses of oxygen isotopes. *87th Annual Meeting of the American Association of Physical Anthropologists*, Austin, TX, April 10-14, 2018.
- Green DR**, Colman AS (2017) How tooth isotope sample number and location affect seasonality reconstruction. *Society of Vertebrate Paleontology annual meeting*, Calgary (presentation).
- Green DR**, Colman AS, Green GM, Tafforeau P, Bidlack F, Smith TM (2017) Seasonal climate reconstruction from seasonality in teeth. *National Cabinet of Archaeology*, Havana (presentation).
- Green DR**, Colman AS, Green GM, Tafforeau P, Bidlack F, Smith TM (2017) New Tooth Growth Model for Studying Ancient Climate. *Goldschmidt annual meeting*, Paris (presentation).
- Green DR**, Colman AS (2017) Phosphate-water  $\delta^{18}\text{O}$  offset revision improves paleoclimatic reconstructions. *American Association of Physical Anthropologists annual meeting*, New Orleans (poster).

- Smith TM, Austin C, **Green DR**, Arora M (2017) Trace element studies support rapid tooth enamel mineralization at the enamel-dentine junction. *86th Annual Meeting of the American Association of Physical Anthropologists, New Orleans, LA, April 19-22, 2017.*
- Green DR**, Colman AS, Green GM, Bidlack F, Tafforeau P, Smith TM (2016) Experimental water switch in sheep improves models for seasonal climate reconstruction. *American Association of Physical Anthropologists annual meeting, Atlanta (poster).*
- Green DR**, Colman AS, Green GM, Tafforeau P, Bidlack F, Smith TM (2015) Seasonal climate reconstruction with isotopes and synchrotron X-rays. *Cleveland Museum of Natural History Paleoecology Symposium. Cleveland, OH (poster)*
- Green DR**, Green GM, Colman AS, Tafforeau P, Smith TM (2015) Synchrotron x-ray imaging and MCMC support seasonal climate reconstruction. *American Association of Physical Anthropologists annual meeting, St. Louis, MO (poster)*
- Green DR**, Green GM, Tafforeau P, Weaver J, Colman AS, Smith TM (2014) Synchrotron imaging helps reconstruct mineralization patterns, and ancient climate. *Gordon Conference on Biomineralization, New London, NH (poster)*
- Green DR**, Green GM, Smith TM, Tafforeau P (2013) Microtomographic assessment of mineralization patterns to inform isotope paleoenvironmental reconstruction. *American Association of Physical Anthropologists annual meeting, Knoxville, TN (poster)*
- Green DR**, Weaver J, Smith TM (2012) Quantitative Density with micro-Computed tomography: mapping mineralization. *Society of Integrative and Comparative Biology: Division of Vertebrate Morphology annual meeting. Amherst, MA (presentation)*
- Green DR**, Glowacka H, Schwartz GT, Reid DJ, Martin LB, Smith TM (2011) Developmental Variation in Great Ape Molar Crowns. *American Association of Physical Anthropologists annual meeting, Minneapolis, MN (poster)*
- Smith TM, Zermeno JP, **Green DR**, Reid DJ, Tafforeau P (2011) Daily secretion rates, prism paths, and cuspal formation times in hominoid molars. *15th International Symposium on Dental Morphology, Newcastle, UK, August 24-27, 2011.*
- Green DR**, Braun J, Morgan M, Pilbeam D, Tuross N, Smith TM (2010) Integrating carbon and oxygen isotope signals: seasonality in the Siwaliks, Pakistan. *Society of Integrative and Comparative Biology: Division of Vertebrate Morphology annual meeting. Cambridge, MA (presentation)*

## Training Programs

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<b>Harvard University Instructor Training</b> The Derek Bok Center for Teaching and Learning	2013, 2014
<b>East Turkana Geological Field School</b> National Science Foundation, Turkana, Kenya Directors: Thure Cerling, PhD and Frank Brown, PhD	2011
<b>Stable Isotope Biogeochemistry and Ecology Short Course</b> University of Utah Stable Isotope Ratio Facility for Ecological Research Directors: Jim Ehleringer, PhD and Thure Cerling, PhD	2010

## Teaching Experience

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### Lecturer, Head instructor

*Harvard University, Department of Human Evolutionary Biology:*

Graduate Proseminar, Introduction to Human Evolution (co-taught)	2019
Climate Change and Human Evolution	2018, 2020
<b>Teaching Assistant</b>	
<i>Harvard University</i> , Department of Human Evolutionary Biology:	
Introduction to Human Evolution – Sophomore Concentration Tutorial	2015, 2017
Human Evolutionary Anatomy	2012
<b>Teaching Assistant</b>	
<i>Turkana Basin Institute &amp; SUNY Stony Brook</i> , Field School:	
Geology, Ecology, Paleontology, Archaeology, Evolution and Anatomy	2011

## Honors and Awards

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<b>Harvard University</b> Certificate of Distinction in Teaching	2012
<b>Italian Institute for Philosophical Studies</b> Warburg Seminar Award	2009
<b>University of Michigan</b> Aix-en-Provence Travel Award	2006 – 2007
<b>University of Michigan Biological Station</b> Academic Scholarship	2006
<b>University of Michigan</b> Honors Program	2003 – 2008

## Public Outreach, Service and Mentorship

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<b>Reviewer</b>	2016 – present
<i>Geochimica et Cosmochimica Acta, Chemical Geology, Quaternary International, FeBS Federation of European Biochemical Societies Journal, Journal of Archaeological Science</i>	
<b>Wikipedia</b> editor	2011 – present
authored 60+ articles, including on the Turkana Basin, with more than 4 million pageviews	
<b>Forsyth Institute</b> undergraduate laboratory research mentor	2017
<b>Harvard University</b> Eliot House Resident Tutor	2012 – 2016
focus on biology, graduate school applications, Marshall, Rhodes, and Fulbright fellowships, research experiences and funding.	
<b>Harvard University</b> undergraduate laboratory research mentor	2009 – 2016
<b>Harvard Museum of Comparative Zoology</b> Volunteer	2011 – 2013
<b>University of Michigan</b> Society of Biology Students Co-President	2007 – 2008

## Additional Skills

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Python; HTML; qGIS; French

## References

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**Dr. Tanya M. Smith**  
*Griffith University*  
 Professor  
 Australian Research Centre for Human Evolution

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**Dr. David Pilbeam**

*Harvard University*  
Henry Ford II Professor of Human Evolution  
Department of Human Evolutionary Biology  
Graduate Committee Member  
(617) 495-4736  
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**Dr. Daniel Lieberman**

*Harvard University*  
Edwin M. Lerner II Professor of Biological Sciences  
Department of Human Evolutionary Biology  
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(617) 495-5479  
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**Dr. Thure Cerling**

*University of Utah*  
Francis Brown Presidential Chair  
Department of Geology & Geophysics  
(801) 581-7062  
thure.cerling@utah.edu

**Dr. Albert Colman**

*Rice University*  
Adjunct Associate Professor  
Department of Earth, Environmental and Planetary Sciences  
Graduate Committee Member  
(443) 838-1327  
ascolman@gmail.com

**Dr. Thomas Van Dyke**

*The Forsyth Institute*  
Vice President of Clinical and Translational Research  
NIH Postdoctoral Training Program Director  
(617) 892-8503  
tvandyke@forsyth.org