Inventing a New Discipline
Annual Bulletin 2018

2018 was another banner year for the **Initiative for the Science of the Human Past at Harvard (SoHP)**, culminating in global headlines for the Historical Ice Core Project, a collaboration with the Climate Change Institute (CCI) at the University of Maine. Countless publications and broadcasts, from *Time Magazine*, to *Science*, *Le Figaro*, the *Times of London* and beyond (and spanning from Latin America to Europe to China) covered the discovery of the origins of the 536 AD volcano that cast a pall over much of the globe, initiating the Late Antique Little Ice Age – as revealed by advanced laser ablation technology, pioneered to study the ice core sample extracted by SoHP and CCI in 2012 from the Swiss Colle Gnifetti glacier. The study, "Alpine ice-core evidence for the transformation of the European monetary system, AD 640–670," appeared in *Antiquity* in open access on November 14th to coincide with SoHP's public workshop "Climate, Pollution, and Economic Growth in Human History" on the latest results of this research project – including the sourcing of the Icelandic tephra particles. The team now studies *millennia* of history trapped in the ice core record, including revelations on lead pollution dating back centuries and publicly announced in the November 15th Lead Summit at Harvard – an event which featured experts on *contemporary* lead contamination and its harmful effects, including Philip Landrigan (Boston College), Bruce Lanphear (Simon Frasier), and Jessica Reyes (Amherst College) -- with Alex More (Harvard University), Paul Mayewski (CCI, University of Maine) and Michael McCormick (Harvard University), and comments from Joel Schwartz (Harvard University), to set the context: anthropogenic lead levels polluting the atmosphere far earlier than was known, and interrupted only by the Black Death annihilating half of the European population in the mid 14th century – all revealed with unparalleled precision by our ice core record and layer-counting techniques in this truly *unique* collaboration between scientists and historians.

Le Figaro: December 6, 2018


Paul Mayewski at Lead Summit

In the field, an SoHP team -- including Harvard GSAS students Claire Adams, Jake Ransohoff, and Henry Gruber along with Prof. McCormick -- returned to the Visigothic royal city of Reccopolis, collaborating with the Universidad de Alcalá to sound trenches in the western suburb and to excavate the Tagus River palaeochannel in August. In September, Michael McCormick returned to the site, to perform experimental high-speed geomagnetic surveying with new technology from the Deutsches Archäologisches Institut, along with colleagues Knut Rassmann (DAI) and Lauro Olmo Encisco (Universidad de Alcalá). Findings for recent seasons -- "Reccopolis Revealed: The first geomagnetic mapping of the early medieval Visigothic royal town founded in AD 578" -- will soon appear in the journal *Antiquity.*


Jake Ransohoff, Henry Gruber, Claire Adams at Reccopolis Excavation


Harvard Team with Lauro Olmo Enciso (center) at Reccopolis

The **Max Planck-Harvard Research Center for the Archaeoscience of the Ancient Mediterranean (MHAAM)** had another remarkable year of collaborative research. Co-Director Johannes Krause presented "Death by Contact: Ancient Pathogen Genomes from Epidemics in Early Mexico" to an overflowing crowd at Harvard, with comments provided by Edward Ryan (MGH, HMS, HSPH) and Noreen Tuross (Harvard Human Evolutionary Biology). A concurrent MHAAM workshop on ancient pathogens with invited scientists Joseph Hinnebusch (NIH), Kenneth


Johannes Krause lectures at CGIS South

Gage (CDC), and David Orton (University of York), as well as SoHP colleague Kyle Harper (University of Oklahoma), drew participants from every corner of Harvard: HMS, HGHI, HSPH, Anthropology, OEB, HEB and beyond. The MHAAM team met in Cambridge to discuss plague vectors of *Yersinia Pestis*, following earlier meetings with Yilmaz Erdal (Hacettepe University, Turkey) on bioarchaeology, burial customs and aDNA research, and with Alfredo Coppa (La Sapienza University, Rome) to discuss the Justinianic pandemic with students, and to visit the Reich aDNA lab at HMS. During the fall term, the MHAAM team met in Jena, Germany to share updates on research, to meet with the international MHAAM Scientific Advisory Committee, and to plan future collaborative work. SoHP and MHAAM had an exceptional presence at the 8th International Symposium on Biomolecular Archaeology in Germany in September, accounting for at least 19 of the talks and posters presented. Team leaders Krause, McCormick, and David Reich then traveled to Rome to meet with eminent Italian colleagues to plan the next phase of MHAAM archaeogenetic study of Mediterranean peoples and pathogens. Discussions at HMS continued this fall when Krause and McCormick coordinated an *ad hoc* workshop with Drs. Stephen Calderwood and Edward Ryan at Mass. General's Infectious Diseases Division. MHAAM research on the spread of pathogens, both in the ancient world and during WWI, was featured in Outbreak Week at Harvard, sponsored by the Harvard Global Health Institute.

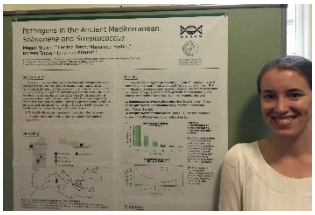
MHAAM Research Team & Scientific Advisory Committee Members in Jena

Outbreak Week Panel on WWI Pandemic

A record 11 undergraduate and Master's students participated in the 3rd annual SoHP / MHAAM Young Investigator Symposium at Harvard, traveling from cities across North America, as well as from the UK, Greece, and China to present innovative research on the science of the human past. SoHP / MHAAM graduate students Aurora Allshouse and Megan Michel successfully completed their 1st year at Harvard and are currently G2 students in Anthropology and Human Evolutionary Biology, respectively. Aurora excavated Minoan remains on Crete this summer, and processed aDNA samples from her site in the labs at our MHAAM partner, the Max Planck Institute for the Science of Human History (MPISHH) in Jena, Germany. Megan extracted aDNA from dental pulp and used next generation shotgun sequencing to research ancient pathogens, as well as to investigate skeletal remains from the Harvard Sardis excavation, during her summer at MPISHH. A further MHAAM Fellowship was awarded to GSAS Organismic and Evolutionary Biology student Eadaoin Harney, to support her research on skeletal aDNA and complex population histories at Roopkund Lake in India. Eadaoin was lead author this year for the *Nature Communications* article "Ancient DNA from Chalcolithic Israel reveals the role of population mixture in cultural transformation." Our first sponsored MHAAM undergraduate, Harvard College Senior Sonja Eliason (concentrating in Human Evolutionary Biology), pursued research at the MPISHH labs in the late fall, towards her senior thesis (co-advised by McCormick) investigating plague genomes from ca. 1800 BC to ca. 600 AD in order to understand what is unique about the bacterium behind the late Roman Justinianic Pandemic of *Yersinia Pestis*.

Jenail Marshall at Young Investigator Symposium

Aurora Allshouse on Crete



Megan Michel at ISBA in Jena

Eadaoin Harney at work in Clean Room

Sonja Eliason, Dunster House '19, at MPISHH in Jena

The SoHP lecture series, "**What's New in the Fall of the Roman Empire**," sponsored a talk by Kimberly Bowes (UPenn) on new archaeological discoveries using geomagnetic prospection and pollen analysis, revealing patterns of rural mobility and surprising agricultural practices in Roman Tuscany. Leslie Dossey (Loyola University Chicago) and Orlando Patterson (Harvard Sociology) provided comments. McCormick presented the work of SoHP at Stanford University, UC Davis, and Iowa State, and delivered the Fellow's Plenary Lecture at the Annual Meeting of the Medieval Academy of America on *"DNA, Ice Cores, and Digital Humanities: Doing Medieval History and Archaeology in the 21st Century."* He was also invited to speak at the Lorenz Center in Leiden for the conference "Diaspora, Migration and the Sciences: A New Integrated Perspective," presented along with Malcolm H. Wiener at the notable Google Science Foo Camp, and additionally spoke on current Harvard-Jena research at the

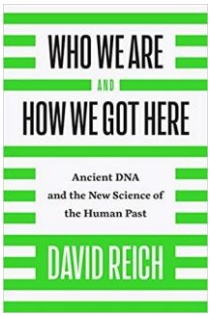
Boston German Consulate along with MHAAM post-doc Alissa Mittnik and HMS Research Associate Iosif Lazaridis. As part of Harvard alumni outreach efforts, Mike also presented SoHP research to groups in Atlanta, Seattle, San Francisco, Palo Alto, Helsinki, and around the Baltic.

The *Digital Atlas for Roman and Medieval Civilizations* (DARMC) vastly expanded its big data sets, e.g., climate geodabases, is experimenting with geodatabases of Roman laws, and is training the next generation of Harvard undergrads on the integration of history, science, environmental studies, and digital humanities. DARMC migrates soon to a new ArcGIS platform with many additional layering features and state-of-the-art data illumination, allowing global open access for countless forms of research, and will also extend its timeline as SoHP reaches further back (and forwards) into historical records.

DARMC Research Team at Harvard

College Senior Brian Yu (Computer Science, SEAS) is writing his thesis in computational philology under SoHP colleague Stuart Shieber, attempting to attribute authorship to jointly-written documents. In a study of authorship attribution, SoHP alumnus Jakub Kabala (Davidson College) applied the Bray-Curtis distance metric and the logistic regression algorithm to show that a wandering cleric for hire penned controverted Latin texts in the twelfth century, white-washing Venetian relic theft from the Byzantine empire, and creating the first history of Poland for an ambitious and desperate duke.

SoHP and MHAAM team members generated numerous publications this year, including David Reich's acclaimed new book, *"Who We Are and How We Got Here: Ancient DNA and the New Science of the Human Past,"* which the *New York Times* called the "best up-to-date account … if you want to understand our origins over the course of the last 100,000 years." With lead author Stefanie Eisenmann, MHAAM saw its first Harvard-Jena publication "Reconciling material cultures in archaeology with genetic data: the nomenclature of clusters emerging from archaeogenomic analysis" in *Nature: Scientific Reports* – a follow-up to heated discussions during the MHAAM April meetings in Cambridge. David Reich's team also published a mitochondrial genome analaysis of a 4000-year-old Egyptian mummy, the genomic history of southeastern Europe, the Bell Beaker phenomenon and the genomic transformation of northwest Europe, and the genetic prehistory of the Baltic Sea region. The Historical Ice Core Project's publications during 2018 also included "Temperature and Mineral Dust Variability in Low-accumulation Alpine Ice Cores Over the Last Millennium," in *Climate of the Past*, and "The Role of Historical Context in Understanding Past Climate Pollution and Health Data in Transdisciplinary Studies: Reply to Comments on More et al., 2017," in *GeoHealth.* Kyle Harper and McCormick wrote on "Reconstructing the Roman climate" in the volume, *The science of Roman history: biology, climate, and the future of the past*, while McCormick also penned "En fin de compte: micro-archéologie, numismatique quantitative et systems d'information géographique," in *Mine, metal, monnaie, Melle. Les voies de la quantification de l'histoire monétaire du haut Moyen Âge*. Finally, Joachim Henning (Goethe-Universität Frankfurt am Main) and McCormick co-authored "A New Late Antique Fortified Settlement in Northeastern Gaul: *Decem Pagi*—Tarquimpol (Moselle). First Synthesis of Archaeological Investigations, 2007–2012" for the *Journal of Late Antiquity,* a culmination of several years of advanced remote prospection, sounding trenches and scientific dating which uncovered the unexpected story of abandonment of an impressive Roman country town, and its reconstruction and flourishing as a fortified settlement in the last century of Roman power in Northeast Gaul.



David Reich's New Book on aDNA

With great expectations for the year ahead … we are extremely gratified by the outpouring of public interest in the research of SoHP and MHAAM in 2018, and the potential to influence generations of young scientists and scholars towards a future in the new, collaborative study of archaeoscience, all made possible by the generous support of our donors.

SoHP & MHAAM Research Team members at ISBA, Jena, Germany