SoHP
The Initiative for the Science of the Human Past at Harvard

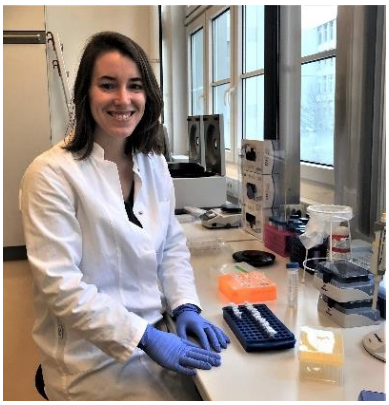
Inventing a New Discipline
Annual Bulletin 2019

MHAAM

Another productive year for the Science of the Human Past saw our labs, seminars and research groups make quite an impact in various hotly debated areas of early human history and archaeology. More details will be forthcoming in future Impact Statements but for now, here are some highlights of 2019, including our work on ancient pandemics which, alas, has become all too timely.

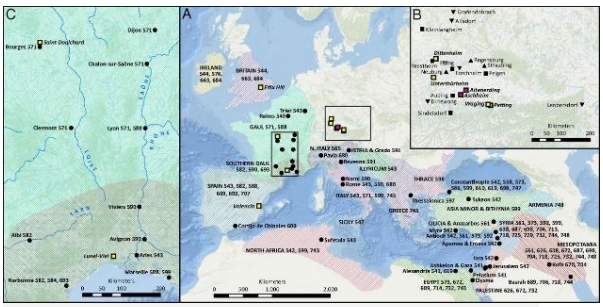
The Max Planck-Harvard Research Center for the Archaeoscience of the Ancient Mediterranean (MHAAM), Jena (Germany), Cambridge and Boston.

Ancient DNA work has advanced unexpectedly swiftly the reconstruction of the peopling of the pre-Classical Mediterranean. Contributions from labs directed by SoHP and MHAAM's David Reich and MHAAM's Johannes Krause have revealed the local origins of early Anatolian farmers, genetic tracing of the potential migration of "Sea Peoples," the ancestry of Iron Age Iberians, early population formation in South and Central Asia, gender-based inequalities in Bronze Age Germany, genetic isolation within the Indus Valley Civilization, text-based evidence for early CE Mediterranean plague, and the origins of herders in sub-Saharan Africa. The impact of ancient DNA research is transforming our understanding of human migration and mobility and offers untold possibilities when coupled with archaeological and historical research. For example, the Max Planck-Harvard Research Center's ancient DNA work has teamed up with traditional scholarly approaches to cast startling new light on the extent of the plague pandemic that swept the Mediterranean Roman Empire and beyond in the time of Emperor Justinian.



MHAAM G3 Megan Michel in Jena Lab

In Ancient Yersinia pestis genomes from across Western Europe reveal early diversification during the First Pandemic (541–750) (PNAS 2019), Cambridge and Jena researchers identified bubonic plague (*Yersinia pestis*) in eight new sites from France, Germany, Spain and, most surprisingly, Britain, demonstrating the plague's spatial reach during the Justinianic Pandemic, its early medieval microdiversity, and documenting the first Mediterranean victims in Spain and southern France.



Geographic extent of the First Pandemic /sampled sites

Research Center Co-Director at Harvard Prof. Michael McCormick presented SoHP projects at the Académie des Inscriptions et Belles-Lettres in Paris; the European Molecular Biology Organization/Lab (EMBO/EMBL) Symposium in Heidelberg, Germany; and at the École française, Rome. MHAAM organized with the German Archaeological Institute a conference on "Integrating Archaeology and Science in Anatolian Archaeology" in Istanbul, Turkey where McCormick introduced our cross-disciplinary research on health and diseases, and Research Center grad student Megan Michel presented her identification of Salmonella enterica at the Minoan site at Haghios Charalambos (Crete). Jena students/post-docs Stefanie Eisenmann, Michal Feldman, and Eirini Skourtanioti gave research talks spanning Neolithic, Chalcolithic, Bronze and Iron Age populations and their genetic origins in Anatolia.

MHAAM Istanbul Workshop

McCormick also worked with French colleagues in the Languedoc region, investigating mass graves and further connections to early plague. With the Standing Committee on Archaeology, the Research Center co-sponsored a talk at Harvard by our post-doctoral Fellow, Dr. Alissa Mittnik (MHAAM and Harvard Medical School) on "Marriage, mobility and households in Bronze Age Germany: integrating ancient DNA, isotopes and archaeology" about her discoveries unveiling ancient family structures which she published in *Science*. A major Research Center meeting capped the year at Harvard, including a special pathogen session with invited researchers from our collaboration with the Dept. of Archaeogenetics of the Jena Max Planck Institute (MPI-SHH) along with SoHP/Harvard (FAS, Medical School, Public Health, Global Health and the Broad) and MIT colleagues. With support from the Institute for Aegean Prehistory (INSTAP), "From Homer to History with the Max Planck-Harvard Research Center. Recent results from Bronze Age Investigations" highlighted the Research Center's first three years of research, with nine public talks featuring archaeogenetic analyses extending from Iberia, Sicily, and the western Mediterranean islands to Crete, Philistine Ashkelon and the Near East. Harvard Vice Provost Mark Elliott introduced the lectures and commented on the extraordinary success of the Research Center thus far, marked since 2016 by 25 publications in leading journals and many more in the works.

Dr. Alissa Mittnik (HMS) : MHAAM Lecture


Vice Provost Mark Elliott introduces MHAAM Lectures

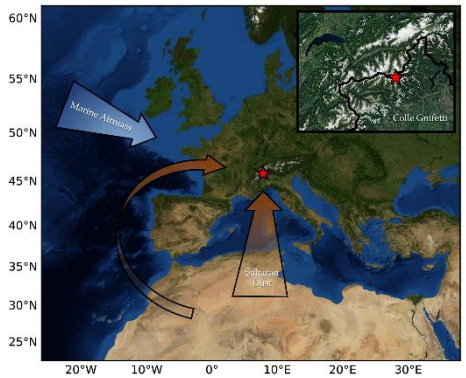
MHAAM Public Workshop


Sonja Eliason at MHAAM-Jena Labs

The Research Center's third fully-funded PhD student, Reed Morgan, began study in Harvard's History Department this fall, and plans to train at the MPI-SHH labs in Germany as well. He joins current MHAAM 3rd-year students Megan Michel, who is conducting an aDNA analysis of ancient pathogens in Jena, and Aurora Allshouse, who continues isotopic work and other Bronze Age research/teaching in the Harvard Anthropology/Archaeology program working with new SoHP Steering Committee member and Max Planck-Harvard Research Center collaborator Prof. Christina Warinner. Sonja Eliason was the first Harvard College undergraduate to do research in the magnificent ancient pathogen labs in Jena, Germany, writing her senior thesis (Human Evolutionary Biology and History), on ancient plague genomes.

Historical Ice Core Project (HICP)

SoHP's successful collaboration with the Climate Change Institute at the University of Maine, the Historical Ice Core Project -- which retrieved an ice core from the threatened glacier on Colle Gnifetti in the Swiss-Italian Alps in 2013 -- continues to provide remarkable results as the analysis of layers reaches deep into Antiquity. The ancient atmospheres trapped in glaciers preserve traces of volcanic activity, temperatures, precipitation, movements of air masses, and pollution resulting from metal production and biomass burning, among other phenomena. The Ice Core Project has now worked its way down and back to Late Antiquity. Our 2019 research focused on Saharan dust, which marks the



Summer trajectories for Saharan dust transport

transport of warm African air masses into Europe, and which is preserved in the ice core. In a 2019 *JGR Atmospheres* publication, our team presented a new annually resolved Saharan dust record in concert with historical records to improve interpretations of human-climate interactions over the last 2000 years; the ice core indicates that the past century has seen an increased amount of Saharan dust transport.

The Historical Ice Core received a second renewal of funding through the generosity of Arcadia, a charitable fund of Lisbet Rausing and Peter Baldwin, to allow continuing analysis of the ancient ice via the unprecedented ultra-high-resolution laser ablation technology developed by team co-director Prof. Paul Mayewski and colleagues at the Climate Change Institute. In two multi-day workshops the project's faculty researchers, postdocs, grad students, and undergrads paired historical and economic information with single and multi-element analyses, year by year, to continue to discover evidence of medieval economies and other yet-to-be revealed trends and truths trapped in the ice.

The Initiative for the Science of the Human Past (SoHP)

HISTORY 1056 Ceramics Field Trip

SoHP offered an undergraduate course this fall on the "New Science of the Human Past: Case Studies at the Cutting Edge," (History 1056) which featured field trips to core trees and reconstruct Boston precipitation at the Arnold Arboretum, and, after exploring Roman pots with X-Ray Fluorescence, students learned (and practiced) ancient Roman pot-throwing at the Harvard Ceramics Studio. Hist. 1056 culminated with 30 student presentations and posters on topics ranging from the archaeology and genetics of ancient Minoans to climate change around the Dead Sea. Guest lecturers David Reich (Medical School), Christina Warinner (Anthro/Archaeology), Alexander More (SoHP), and Jake Ransohoff (History) assisted by MHAAM/Harvard OEB grad student Eadaoin Harney, joined McCormick in a course spanning the science of ancient DNA, climate change and ice core technology, ancient materials, economies, and diseases, and the plethora of archaeoscientific research possibilities in the Digital Humanities.

HISTORY 1056 Coring at Arnold Arboretum

McCormick also spoke on SoHP's ancient DNA and plague research, historical ice core analyses, and data science projects to wide audiences while on sabbatical at Harvard's Dumbarton Oaks in spring 2019, and at Canisius College in Buffalo, NY, in the fall. SoHP continues to make progress on its new geodatabase of historical records on the First Plague Pandemic. As it undergoes a major technical upgrade, SoHP's Digital Atlas, DARMC, is expanding both temporally and geographically. It will be relaunched in 2020 to reflect a more global approach for this digital atlas, created by Harvard College undergrad and alumni researchers, and used half a million times since late 2018. In parallel, the Documentary Archaeology (DALME) project led by Prof. Daniel Smail (History-SoHP) and Dr. Gabriel Pizzorno (History), and supported in part by SoHP, makes available to the public and the scholarly community an unprecedented dataset of 20,000 material objects documented in medieval notarial records. DALME will allow new kinds of quantitative insights into the everyday lives of pre-modern people.

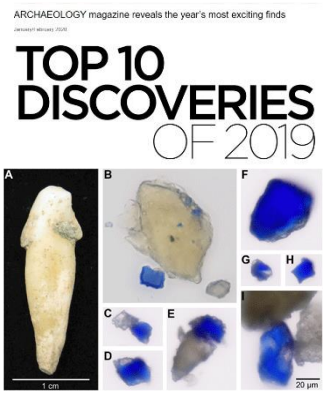
Michael McCormick lectures on SoHP in DC

Additionally, in 2019 McCormick authored a PNAS Commentary on "Radiocarbon dating the end of urban services in a late Roman town" and co-authored the results of his Iberian SoHP archaeological collaboration with Lauro Olmo Encisco (Universidad de Alcalá), Joachim Henning

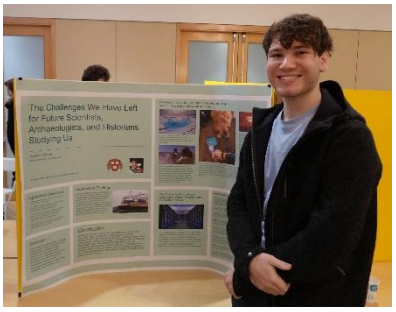
(Goethe Universität), Knut Rassmann (Deutsches Archäologisches Institut), and Harvard History students in "Reccopolis revealed: the first geomagnetic mapping of the early medieval Visigothic royal town." SoHP Steering Committee member Peter Huybers (Earth and Planetary Sciences) published new research on sea surface temperatures and garnered news on correcting early data science on climate change via outlets such as NPR. McCormick published an essay on the revolution in climate history arising from the synthesis of humanistic and archaeoscientific techniques.

NPR Covers Peter Huyber's Article

New Steering Committee member Christina Warinner, whose involvement with SoHP goes back to her graduate student days at Harvard, led or contributed to half a dozen archaeoscientific publications this year, ranging from methodological advances in detecting ancient pathogens to showing the power of SoHP approaches for modern history, by identifying from their remains the imported food that failed to save victims of the Irish Famine and by illuminating the complex socio-economic immigrant experiences and identities during New England's Industrial Revolution and clarifying the importance of new historical discoveries for accurately understanding the modern oral microbiome. But her coolest publication, along with Anita Radini (University of York) *et al.* was surely **"**Medieval women's early involvement in manuscript production suggested by lapis lazuli identification in dental calculus" for *Science Advances*, which received widespread press coverage including *Science*, the *Atlantic*, NPR, the *New York Times*, and *National Geographic*. The identification from physical remains of the first female medieval artist was considered one of the 10 top global discoveries for 2019 by *Archaeology* magazine.



Lapis Lazuli particles embedded in dental calculus


HIST 1056 Undergrad Poster Session

As we move into the new decade, our fund-raising efforts continue in order to maintain and develop this extraordinary new Science of the Human Past in concert with our students in the College, our graduate and post-doctoral researchers and our colleagues.