

institute of human origins

2016 Year-end Highlights

Dear Friend of the Institute of Human Origins,

Next year, the Institute of Human Origins will have been at Arizona State University for 20 years! The original team, comprising Don Johanson, Bill Kimbel, and Kaye Reed, has now grown to 16 core and affiliated faculty, spread across a growing array of disciplines. Read more about plans to celebrate this milestone inside.

We are grateful to everyone who has helped support IHO's programs through annual gifts to our operating fund, direct support of our research, investment in our long-term success through endowment gifts and bequests, or participation in one of our wonderful international tour programs. It is the broad support from many sources that enables IHO researchers to push forward on the fundamental questions about our origins—How did we become human?

While we continue to have the strong backing of ASU for our faculty and facilities, our research, training, and outreach programs rely more than ever on the generosity of donors whose passion for the study of human origins creates the strong “public-private partnership” we enjoy with ASU.

Please consider the opportunities that your end-of-the-year gift will provide for future discovery and research and then join the quest for our origins by supporting IHO with your generous charitable gift. Enclosed you'll find the Gift/Pledge Form for your convenience. Or, you can go to IHO's website at <https://iho.asu.edu/support/supportIHO> to give securely online.

As we move into 2017, look for developing stories on our research from the John Templeton Foundation grant and as IHO science expands to the genetics of great ape populations and the nature of social cooperation.

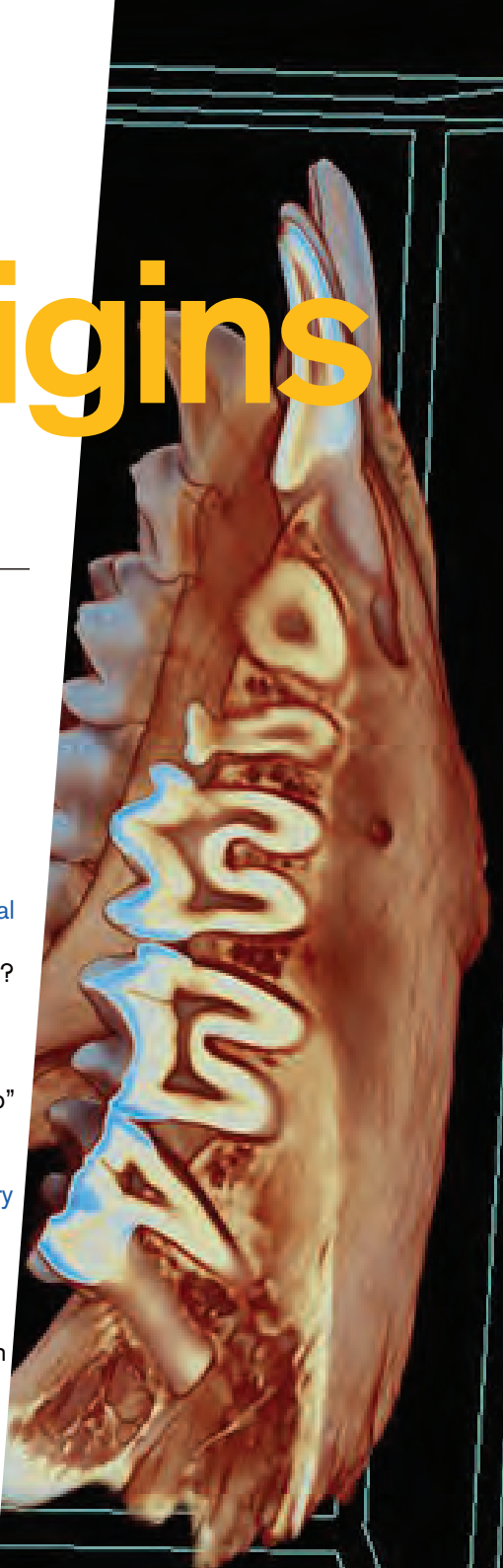
I thank you in advance for your support and look forward to hearing from you.

Best wishes for the New Year,



William H. Kimbel, PhD
Director

Virginia M. Ullman Professor of Natural History and the Environment



Using high-resolution micro CT-scanning technology, the John Templeton-funded Visualization Lab is now producing detailed images of the complex interior structures of fossils, with clarity unseen before.



science

In the Field and Lab

Deep into the second year of the **three-year, \$4.9 million John Templeton Foundation grant**, led by IHO Director William Kimbel, IHO scientists are working to weave the threads of all 11 projects into a cohesive narrative of how key traits in human evolution played crucial roles in our species' emergence. Large brains, long life spans, social cooperation, and complex communication skills are among those behavioral, cognitive, and emotional differences that set us apart. It is a complex puzzle that no other group of scientists has attempted to answer in such a holistic fashion. The research projects, focusing on the **Evolutionary Foundations of Human Uniqueness**, have already resulted in over 20 new research publications and an expansion of IHO's inventory of field sites to the **Fiji Islands, Philippines, Bolivia, and Kenya**. More information on the Templeton project can be found on the IHO website at <https://iho.asu.edu/research/iho-templeton-research-program>.

IHO Associate Director Curtis Marean has directed archaeological field research on the **southern coast of South Africa** for nearly 20 years. At the Pinnacle Point cave sites, evidence of modern human adaptation stretches back some 160,000 years. **New explorations at Knysna**, 100 kilometers east of Mossel Bay, by University of Texas colleague Naomi Cleghorn, and **on the eastern coast at Pondoland** by IHO Assistant Research Scientist Erich Fisher, are expanding IHO field research on modern human origins in coastal settings. This expanded research focuses on our early ancestors' development of extreme cooperation and social learning.

During 2016, IHO Research Associate Kaye Reed spent a month at the National Museum of Ethiopia analyzing fossils, seeking data on environmental conditions to set the 2013 discovery of the 2.8 million-year-old *Homo* jaw at the research site at **Ledi-Geraru, Ethiopia**, in context. The time period between the end of *Australopithecus afarensis* and this *Homo* jaw—only 200,000 years—is still one of the most mysterious but important timespans to understand the origins of our own genus.

IHO Research Associate Kim Hill has expanded his work with **Ache hunter-gatherer communities in Paraguay** to coastal foraging societies in the **Philippines**. He is examining intertidal foraging rates and cooperative and social interaction networks. These data can be used in agent-based computer models of prehistoric hunter-gatherer economies in South Africa, building on Curtis Marean's research on early modern humans at Pinnacle Point.

Rock shelters at the coastal Waterfall Bluff at Lambasi, Pondoland, South Africa, are revealing a detailed sequence of paleoenvironments and human occupation during the early Holocene that is filling in key gaps in the coastal foraging archaeological record.

Erich Fisher image
Andrew Ozga image



Working in Anne Stone's lab, IHO Postdoctoral Researcher Andrew Ozga extracts 100,000-year-old bovid DNA from Pinnacle Point, South Africa, in a molecular anthropology cleanroom. The genetic material is built into a DNA library that can then be sequenced and analyzed in an effort to understand ancient bovid mitochondrial genomes and their migratory history.

As the drilling and initial sampling of the cores is complete, research has shifted to the analytical work on more than 10,000 sampling intervals for the **Hominin Sites and Paleolakes Drilling Project**. This multinational collaboration secured continuous, high-resolution paleoenvironmental records from drill cores taken from five ancient lake beds in Kenya and Ethiopia. Led for IHO by Research Associates Chris Campisano and Kaye Reed, the goal is to document how changing environments affected human evolution across more than four million years of geological time. The international team was awarded nearly \$10 million from the National Science Foundation and the International Continental Scientific Drilling Program for this project.

IHO has received funding from the **ASU President's Strategic Initiatives Fund** for new research on **DNA and human origins**. The project connects research by IHO Research Affiliates Anne Stone, Joan Silk, Ian Gilby, and Kevin Langergraber on chimpanzee and baboon genetic diversity as a window on early hominin population structure. Using ancient DNA techniques on fossil faunas from Pinnacle Point excavations, Anne Stone is working with Curtis Marean's group to investigate migratory movements of Pleistocene prey populations as a mirror of early modern human expansion.

With colleagues from the Max Plank Institute of Evolutionary Anthropology (Leipzig), Bill Kimbel has been spearheading a **CT-scanning project of the Hadar Australopithecus afarensis and early Homo fossils at the National Museum of Ethiopia**. The CT data are now being prepared for analysis, and the first study will examine the relationship between morphological variation and internal bone distribution in the early *Australopithecus* mandible, an NSF-funded project (with collaborators Callum Ross, Carol Ward, Andrea Taylor, Zeray Alemseged, and Chris Robinson) asking how dietary shifts influenced jaw structure in human evolution.

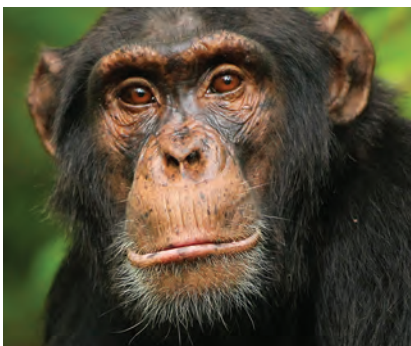
Using **techniques borrowed from the world of GIS** and viewing tooth surface as a geographer would a landscape, Gary Schwatz, along with IHO-affiliated graduate student Halszka Glowacka, are showing that wear on mountain gorilla teeth wear down but create a wealth of new crests and ridges, which effectively enhances a molar's performance over time.

Understanding **how our nonhuman primate cousins** interact with one another in social groups might tell us something about **how our ancient ancestors developed cooperative relationships**. IHO Research Affiliate Joan Silk studies female baboon social bonds and friendships and has identified how vocalizations between females are used to strategically signal benign intent. IHO Research Affiliate Ian Gilby found that, in the world of chimpanzees, it's good to have friends in high places. His work reveals that male chimpanzees that befriended the top-ranking male were more successful at mating with preferred females when in the alpha male's presence. Gilby is the codirector of the Gombe Chimpanzee Database, a repository of detailed demographic and behavioral data on chimpanzees at Gombe National Park in Tanzania.



Carla Handley image

IHO Research Affiliate and Carnegie Fellow Sarah Mathew studies the pastoral societies of East Africa to understand what bonds people in cooperative endeavors that can produce dangerous, often fatal, consequences. Most of her work revolves around the Turkana of Kenya. Mathew's research focuses on two areas—what are the social boundaries of people's moral and cooperative dispositions, and what determines whether there are consistent cross-cultural patterns in the psychological costs of killing in warfare. The image above features IHO Postdoctoral Researcher Carla Handley at a meeting with the Turkana community.



Kevin Langergraber image

In 2016, the Ngogo Chimpanzee Project, codirected by IHO research affiliate Kevin Langergraber, celebrated its 20th anniversary of research and conservation in Kibale National Park, Uganda. Achievements over the past year include the first empirical evaluation of using noninvasive techniques to estimate population size, as well as the demonstration of ancient interbreeding between chimpanzees and their sister species, the bonobo.

Jacob Harris image



IHO-affiliated graduate student and NSF Graduate Research Fellow Jacob Harris spent six months living with the Hadza communities in Tanzania, in research collaboration with Kim Hill and Curtis Marean. Harris's research focused on identifying patterns of prey choice used by Hadza hunters, one of the last groups to subsist primarily by hunting and gathering.

John Rowan images



The legacy of paleoclimate on modern biodiversity patterns was the subject of a study by Kaye Reed and IHO-affiliated graduate student John Rowan. Their startling finding, that past climates are more important to the structure of mammal communities than the modern climate, implies that African mammal species have either failed to move with their preferred environments over the past several thousand years of climate change or that these species are ecologically flexible and can persist in a wide range of climatic conditions.

Read more about breaking IHO science by joining IHO's email newsletter list. Please make sure your email is up-to-date by emailing Julie Russ (jruss@asu.edu) to stay informed.

Michelle Kline image



IHO Research Affiliate Rob Boyd and Postdoctoral Researcher Maxime Derex suggest that even if we believe that more information is better for everyone, there is one drawback to having access to all this information—it makes us less innovative. Their research is finding insights into how culture may have evolved. About 60,000 years ago, humans emerged from Africa and rapidly spread across the globe. When previously isolated groups met, they brought different skills and cultural traits together, which may have led to sudden leaps of cultural accumulation. The resulting technologies may have helped early humans to quickly adapt to new environments.

publications and presentations

A study by an international team including **Gary Schwartz** and **IHO-affiliated graduate students** Susanne Daly and Kierstin Catlett was **published in the journal *Nature***. The research combined tools from embryology, comparative anatomy, and computational biology to reveal that a single embryonic rule has regulated hominin tooth size. They found strong evidence that adult hominin teeth size was a direct outcome of how big their milk or “baby” teeth were. Read more at **ASU Now**: <http://bit.ly/1WbGjCD>.

Kaye Reed was the featured speaker at IHO’s annual event held at **The Explorers Club in New York City**. She spoke about the discovery of the 2.8-million-year-old *Homo* fossil jaw found at Ledi-Geraru, Ethiopia, and discussed how climate change may have been an important factor in human origins.

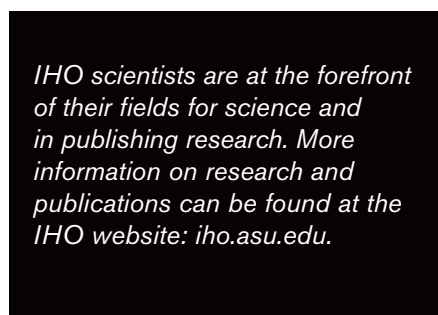
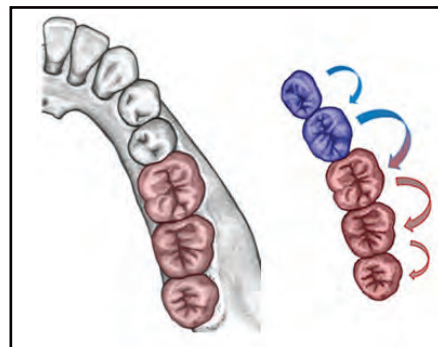
Curtis Marean was the invited speaker for the Leakey Lecture presented in partnership with the Leakey Foundation at the California Academy of Sciences. He spoke on the “Evolution and spread of the most cooperative and invasive species—Us.”

Co-organizer **Bill Kimbel, along with Kaye Reed and Chris Campisano**, attended the third meeting of the African Rift Valley Research Consortium (ARVRC) in New York. ARVRC consists of scientists working across an array of paleoanthropological field projects in eastern Africa dedicated to communication, cooperation, and collaboration on pressing questions about early hominin populations and their relationship to changing African environments during the Pliocene.

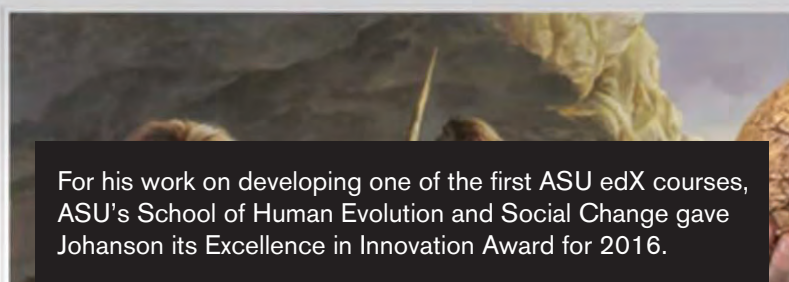
IHO hosted the fourth meeting of the **Southwest Association of Biological Anthropologists** in November. The organization was established in 2013 with Kaye Reed as one of the co-organizers for researchers and students to share ideas and encourage collaboration.

Founding Director Donald Johanson lectured internationally on behalf of IHO with invited speaking engagements in Tbilisi, Georgia, at an international conference on *Homo erectus*; in Barcelona, Spain, at a conference titled “El Origen Africano del genero *Homo*”; in Alacra, Spain, on the story of Lucy; and finally, to inaugurate the Giancarlo Ligabue Fondazione in Venice, Italy, joining an international committee of scientific experts.

Professor Johanson’s online course in **Human Origins through ASU’s new partnership with edX** will begin again January 9, 2017. Explore the scientific evidence for human evolution, our fossil relatives, and the place of humankind in the natural world. This course has already enrolled over 3,000 students, with many opting for full credit through ASU. Or take the course for free, with no commitment for tests or credit. Sign up at <https://www.edx.org/course/human-origins-asux-asm246>.



Neanderthal Anatomy



For his work on developing one of the first ASU edX courses, ASU’s School of Human Evolution and Social Change gave Johanson its Excellence in Innovation Award for 2016.



awards and student recognition

Anne Stone, IHO Research Affiliate, was elected to the prestigious **National Academy of Sciences** and named as one of three newest **ASU Regents' Professors**. Professor Stone is an anthropological geneticist who has transformed knowledge in forensic science, the genetics of infectious diseases, and the evolutionary history of humans and the great apes.

Gary Schwartz, who has devoted his career to unlocking the mysteries of our species' unique life history by studying how our teeth grow, has been **named a fellow of the American Association for the Advancement of Science (AAAS)**. Election as an AAAS Fellow is an honor bestowed upon AAAS members by their peers for their scientifically or socially distinguished efforts to advance science. Read more about Schwartz at <http://bit.ly/2gfsB20>.

IHO Director Bill Kimbel spoke at the 2016 graduation and was presented with an **honorary doctorate of letters** degree from Union College, New York.

Kim Hill became a permanent **senior member of the Canadian Institute for Advanced Research**, an advanced-study center that creates and maintains global research networks working on complex areas of inquiry and one of the most prestigious associations in academia.

The IHO staff and faculty are grateful for the efforts of SHESC **undergraduate students Alexandra Norwood and Madeleine Ordiway** for administrative and website help. Alex has been instrumental in the launch of the AskAnAnthropologist website, and Maddy has almost single-handedly reorganized the IHO library to the Library of Congress system.

During the past year, **Kierstin Catlett**, IHO-affiliated graduate student in the School of Human Evolution and Social Change, received her doctoral degree in anthropology. **Advised by Gary Schwartz**, Catlett defended her dissertation on "A dental topographic analysis of deciduous tooth wear in hominoids." Catlett has taken a position as Adjunct Professor at Mesa Community College, Mesa, Arizona.

outreach

AskAnAnthropologist.asu.edu was launched in February for middle school students and their teachers to learn about anthropology from stone tools to big brains and from climate change to teeth. The lively website has activities for students and short quizzes for teachers to use for assessment of learning. Please alert your students and teachers to this terrific new resource. Future development will include interviews and podcasts with IHO scientists, articles keyed to national science standards, and more activities and games.

Interested in traveling to the Galapagos in 2018? IHO is planning the next cruise to the Galapagos, most likely for June 2018. If you are interested, let us know! Email or call Julie Russ (jruss@asu.edu | 480.727.6571) to be placed on the information list.

If you would like to learn more about IHO, visit the office and labs, come to **ASU's "Night of the Open Door"** open-house on Saturday evening, February 25, 2017. See the "Lucy" skeleton cast and learn about paleoanthropology from IHO-affiliated graduate students.

Save the Dates! On Friday, April 7, 2017, IHO will celebrate 20 years of education, research, and outreach at Arizona State University with a **gala dinner** on the lawn of Old Main on the ASU campus. Tickets and sponsorships will be available in January. On the next day, **Saturday, April 8**, IHO scientists will present the results of 11 different research projects funded by the John Templeton Foundation in a **free public symposium**. To stay up-to-date on dinner and ticket information, go to the events page at <https://iho.asu.edu/news-and-events>.

*Access online giving at <http://asufoundation.org/IHO>.
The appeal code is M0117. Thank you in advance for
your generous gift!*



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