



anthropogeny tracks

a CARTA newsletter

Volume 4, Issue 2 - April 2016

The Legacy of Ancient DNA on Modern Humans

Our genes are more than just a collection of recipes that are used to build and maintain a human. They tell a story about how populations evolved, migrated, and reproduced through the ages. In recent years, the science of ancient DNA has revolutionized human evolution and population genetics research, providing unprecedented insights into the history of our species.

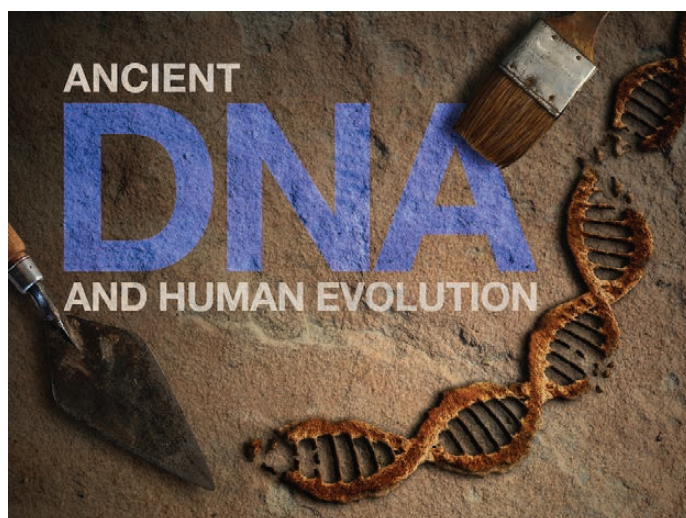
In particular, methodological improvements and innovations over the last ten years have advanced our ability to recover small fragments, target specific sequences, identify damage patterns, and obtain genome scale data. As a result, we have evidence for admixture among modern and archaic humans as well as greater appreciation for the complexity of population histories for modern humans around the world.

CARTA's April 29th symposium, **Ancient DNA and Human Evolution**, will attempt to decode this incredible subject with presentations by researchers at the forefront of ancient DNA research and population genetics to discuss current developments and share insights about human migration and adaptation.

This CARTA symposium is made possible by **The G. Harold and Leila Y. Mathers Charitable Foundation**.

Symposium Details

- Friday, April 29, 1:00 - 5:30 p.m., Pacific
- Conrad T. Prebys Auditorium, Salk Institute
- Free and open to the public, however, registration is required
- Live webcast
- For more information or to register, visit: <https://carta.anthropogeny.org/events/ancient-dna-and-human-evolution>



The outstanding lineup of speakers for CARTA's symposium, **Ancient DNA and Human Evolution**, features:

The Landscape of Archaic Ancestry in Modern Humans
Sriram Sankararaman, University of California, Los Angeles

Prehistoric Human Biology as Inferred from Dental Calculus
Christina Warinner, University of Oklahoma

The Oldest Human DNA Sequences
Matthias Meyer, Max Planck Institute for Evolutionary Anthropology

Neandertal and Denisovan Genomes and What They Tell Us
Kay Prüfer, Max Planck Institute for Evolutionary Anthropology

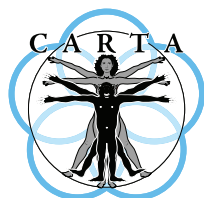
The Origins of Modern Humans in Africa
Brenna Henn, Stony Brook University

A Map of Neandertal Genes in Present Day Humans
Joshua Akey, University of Washington

The Phenotypic Legacy of Neandertal Interbreeding on Modern Humans
Tony Capra, Vanderbilt University

Ancient European Population History
Johannes Krause, Max Planck Institute for the Science of Human History

The Genetic History of the Americas
María C. Ávila-Arcos, National Autonomous University of Mexico



Center for Academic Research and Training in Anthropogeny
"to explore and explain the origins of the human phenomenon"

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It So Happened: James Harvey Handelman and the Origins of CARTA



Left to right: Jim Handelman, Francisco Ayala, Terry Sejnowski

Life is full of unexpected twists and turns, and chance events can sometimes change the course of history. So it is with the story of the late Jim Handelman and his impact on the origins of CARTA.

It so happened that in 1996 Geoff Risch of the UC San Diego Development Office took a chance, and made a cold call to the G. Harold & Leila Y. Mathers Charitable Foundation of New York, asking why the Foundation supported much excellent research throughout the country (including at the Salk Institute in La Jolla)—but not at UC San Diego. Such a blunt approach to an established foundation is usually unsuccessful.

But *it so happened* that the Foundation's Executive Director, Jim Handelman, knew that Nobel Laureate George Palade had just moved from nearby Yale University to become Dean for Scientific Affairs of the UC San Diego School of Medicine. When asked by Jim for an overview of key research programs at the School, *it so happened* that Palade chose not to focus on the major topics of the day (HIV, gene therapy, etc.). Instead, he recommended that Jim look into an obscure recently developed program in "Glycobiology" (scientific exploration of the dense and complex array of sugar chains that are universal to all living cells, but yet still poorly understood.)

During the resulting discussion, Jim was not so impressed with hearing about the then "sexy" areas of Glycobiology, such as selectin biology and genetic alterations of mice. True to his Foundation's principles, Jim instead homed in on our unexpected discovery of the first known genetic difference between humans and our closest cousins, the "great apes" (chimpanzees, bonobos, gorillas, and orangutans), a new finding that was not sufficiently developed to justify conventional grant support. After much discussion, Jim indicated that the Foundation wished to support such aspects of Glycobiology research at UC San Diego that might have the most long-range impact on the field. Thus, our initial Foundation funding was for developing analytical technology to explore novel aspects of Glycobiology, such as comparisons between humans and our closest evolutionary cousins.

It so happened that we had stumbled on this "human-ape" difference while following up on a clue from a "serum sickness reaction" in a patient treated in the 1980s. And *it so happened* that no one else had yet found such a definitive and complete genetic difference that was specific to humans. Combined with watching my daughter grow up from a helpless baby, it was natural to become fascinated with the question of just what it is that makes humans different from other animals. Thus, it became a hobby to pick the brains of intellectuals all across the La Jolla Mesa, ranging from linguists to neuroscientists to anthropologists—asking naïve questions about human uniqueness, from the perspective of

each of their specialties. *It so happened* that Fred "Rusty" Gage of the Salk Institute (one of those experts, and current CARTA co-director) strongly encouraged the idea of gathering these intellectuals together to have discussions about common interests. To our pleasant surprise, they all agreed.

This eclectic collection of enthusiastic participants began to meet in ad hoc sessions at UC San Diego or Salk Institute venues over the next several years, for informal group discussions about "explaining human origins," and sometimes for focused analysis of the latest published research on the subject. Over time, we gradually recruited more local involvement, and finally decided to get ourselves organized—gathering at the Salk Institute on January 11, 1996 (just over twenty years ago today) and grandiosely naming ourselves the "La Jolla Group for Explaining the Origin of Humans" (LOH). To be certain that all discussions would be collegial, transparent and transdisciplinary, one of our founding principles was that no one should seek special attention nor seek personal ego boosts via participation in this activity. *It so happened* that this philosophy was exactly in line with that of the Mathers Foundation, as well as the personal philosophy of its director.

The initial ad hoc LOH discussions were exciting and intellectually intoxicating, and we also took advantage of opportunities to engage expert visitors who happened to pass through the La Jolla area. But we soon found ourselves limited in our knowledge base regarding many key topics relevant to this quest. *It so happened* that email had just become a viable mode of communication. Thus, we next reached out to experts all across the world to get our questions answered, eventually resulting in the creation of an email discussion group called "LOHTalk." (Unlike today, an email discussion group was then a vibrant and effective forum for communication). *It so happened* that Jim Handelman visited around that time and was sitting in my office, waiting for an urgent phone call to finish. When the call was over, Jim pointed at the bookshelf (which was full of volumes relevant to human origins) and said: "That's the same stuff I read!" Thus, Jim heard about the LOH email list and asked to be added to the group as an observer.

It so happened that the position of Interim Director of the UC San Diego Cancer Center needed to be filled, and taking up this position put me in contact with Peter Preuss, a prominent alumnus and local philanthropist with wide-ranging intellectual interests. When Peter heard about the fledgling LOH Project, he offered to bring us all together from across the globe, with support from the Preuss Family Foundation for Brain Tumor Research. When Jim heard about this proposal, he asked to be involved. So it was that the first formal LOH Meeting on "Explaining Humans," sponsored jointly by the Preuss Foundation and the Mathers Foundation, took place February 6-8, 1998, with Peter presiding, and Jim (in his characteristic fashion) listening quietly in the background. This memorable event featured some of our other future leaders and advisors, including current CARTA co-director, Margaret Schoenerger.

Given the focus of the Preuss Foundation on brain tumor research, it was difficult for Peter to help us further. But *it so happened* that Jim was intrigued by the unique nature of the meeting, and was able to convince his board of directors to continue support for this unusual activity, despite it being radically different from their main purview of supporting fundamental work at the frontiers of basic research. Continuing support from the Mathers Foundation thus allowed LOH to host several more such events, and to expand involvement of relevant intellectuals locally, and from around the world.

Each time we went back to the Foundation requesting a new round of funding, Jim would gently nudge us to expand our horizons, and we next evolved into a more formal UC San Diego-recognized Project for Explaining the Origin of Humans, or POH. *It so happened* that Chaitan Baru of the San Diego Supercomputer

Center heard about this activity from us. We were fortunate to thus launch our first website at the Supercomputer Center, which included an online resource now called the [Matrix of Comparative Anthropogeny](#) (MOCA).

It so happened that some of us were attending meetings at the NIH when the horrible events of September 11, 2001 occurred, and were thus stranded in Bethesda for a week. *It so happened* that Eric Green of the National Human Genome Research Initiative (NHGRI), an old friend from shared training experiences, felt badly for his colleagues and took a couple of us out to dinner one evening, at which a discussion began that eventually resulted in lobbying for initiation of a chimpanzee genome project. (It is hard to imagine that in those days, sequencing a genome cost tens of millions of dollars, and there were intense arguments about which species should be chosen to follow the human and mouse genomes!) Once this landmark project came to fruition in 2003, we naturally planned the next POH meeting to involve worldwide experts on this topic, which was highly relevant to exploring human origins. *It so happened* that we expressed regret to Jim that all this intellectual firepower was coming to San Diego, but only impacting a few people. Jim was again intrigued and obtained Foundation support for a March 12, 2004 public symposium, co-chaired with Maynard Olson, on [Sequencing the Chimpanzee Genome: What Have We Learned?](#) This event was so successful that Jim was able to convince his board members to expand the POH program in the direction of more public engagement, resulting in additional public POH symposia on topics as diverse as [The Rise and Fall of *Homo erectus*](#); [Transposable Elements in Primate Evolution](#); [Language - A Key Human Trait](#); and [The Origin and Fate of the Neanderthals](#).

All this time, the POH organization was still relatively informal, from the perspective of the University and the Salk Institute. *It so happened* that Jim had become aware of the difference between such a project and that of a formal Organized Research Unit (ORU), such as the UC San Diego Cancer Center. Thus, he encouraged us to apply for this higher-level organization, and we designated co-directors representing different fields, an associate director to manage training issues, and high-level advisors, both local and global. It so happened that the new Vice-Chancellor for Health Sciences, David Brenner was also an intellectual fan of this subject, and supported the ORU proposal. Meanwhile, the POH leadership realized that no single term then in use defined our agenda: "Anthropology" is a much broader field that includes all studies of humans; "Human Evolution" is a mechanism; and "Human Origins" has many meanings. *It so happened* that we came across an old term that had fallen into disuse decades ago, but perfectly encompassed our quest: the word "Anthropogeny" refers to the scholarly attempt to explore and explain the origin of the human species.

So it was that the Center for Academic Research and Training in Anthropogeny (CARTA) was approved as an ORU on January 25, 2008, and the first CARTA public symposium was held on September 19, 2008, entitled, [Anthropogeny: Defining the Agenda](#), featuring many of our advisors as speakers, and with special guests Salk Institute President and Nobel Laureate, Roger Guillemin, UC San Diego Chancellor, Marye Anne Fox, Vice-Chancellor for Health Science, David Brenner, and Vice-Chancellor for Research, Art Ellis.

All the while, POH participants naturally wished to involve their trainees in this activity. *It so happened* that Jim had frequently interacted with one such trainee (Pascal Gagneux) from the very first meeting in 1998, and came to realize that the future did not lie in the relatively rigid minds of the older members who had started the group, but in the younger generation. This resulted in discussions about the need to involve the very best Ph.D. students from across campus in a formal transdisciplinary Specialization Track in Anthropogeny, as well as the offer of Foundation backing

for such a program. This plan generated widespread support from many graduate programs across campus and came to fruition with formal approval of the track in March 2010, appropriately led by Gagneux, now a faculty member. This eclectic and unique group of young minds representing Ph.D. programs in Anthropology, Biological Sciences, Biomedical Sciences, Cognitive Science, Linguistics, Neurosciences, Psychology, and Visual Arts, meets regularly to exchange ideas. The students are actively involved in the symposia and are paired up with expert speakers at each event. Following each symposium, they write up reports on what they learned. There is probably no other program quite like this one anywhere else in the world.



Left to right: Susan Handelman, Jim Handelman, Alison Brooks

The rest as they say is history, with continued support from the Foundation, UC San Diego and the Salk Institute leadership assuring a vibrant program of intellectual activities, including CARTA symposia on topics as diverse as [Origins of Genus Homo](#), [Unique Features of Human Skin](#), [Human-Climate Interactions](#), [Language Evolution](#), [Domestication](#), [Male Aggression](#), [Grandmothering](#), [Theory of Mind](#), [Nutrition](#), [Autism Spectrum Disorders](#), [Culture-Gene Interactions](#), [Uniquely Human Features of the Brain](#), [The Genetics of Humanness](#), [Altruism](#), [Non-Human Cultures](#), [Art and Aesthetics](#); and [Implications for Medicine](#). Frequent attendance by Jim at these symposia (sitting as always quietly in the background) also provided us opportunities for regular feedback, from the perspective of a non-expert who had watched such organizations grow across the country. Jim also brought in other major supporters such as Annette Merle-Smith, and encouraged the university to develop funding from other sources, including local philanthropists such as Rita Atkinson, who became a regular attendee at CARTA's symposia and a major sponsor. Enthusiasm and support for CARTA continues to grow with each symposium, along with worldwide (over 30 countries) viewership of a live web stream, and of the archived videos of the symposia talks, which have been watched online tens of millions of times by people all across the planet.

Sadly, this remarkable track record of committed and consistent support, advice and encouragement was cut short by a highly malignant cancer, and Jim's passing in February 2016. But even in the midst of his ordeal, Jim managed to make calls from his hospital bed to find out how we were doing. We will all miss him terribly, and are even more committed to ensuring that the novel quest he encouraged and supported for so long be sustained and perpetuated into the future.

Since the Symposia were Jim's favorite aspect of CARTA, we have decided to honor his memory by establishing the [James Handelman Memorial Fund for CARTA Symposia](#).

2016 Anthropogeny Specialization Graduates

To most, spring is a season of fresh beginnings, from leaves budding to birds hatching. In academia, spring also means graduation. This year, five Anthropogeny students will complete the requirements for the **Graduate Specialization in Anthropogeny**, adding a parenthetical degree in Anthropogeny to their Ph.D.s already in progress. In recognition of this achievement, the following two pages feature reflections from each student on their time in the Specialization. We wish the 2016 Anthropogeny graduates congratulations, as well as continued success in their future academic and professional careers!

Whitney Friedman, Cognitive Science

As an interdisciplinary researcher interested in the co-evolution of social and cognitive complexity, the Anthropogeny Specialization Track at UC San Diego provided an invaluable environment for discussion and discovery. From courses to symposia, I can't recall an event in which I wasn't excited by a new idea, or engaged by the discussion generated by a room of scientists crossing



traditional disciplinary boundaries. The specialization provided a broader evolutionary context to my studies, encouraged me to think deeper about the dolphin alliances I study in relation to the alliances among modern humans, and created opportunities to engage the great minds of our field in one-on-one discussion. The Anthropogeny Specialization Track is truly a gift, and will remain one of the most positive experiences of my academic career.

Kiri Hagerman, Anthropology

I have been an Anthropogeny specialization Track student for the past three years. During that time, the Specialization has provided me with training in the field of anthropogeny, and an opportunity to interact with colleagues from

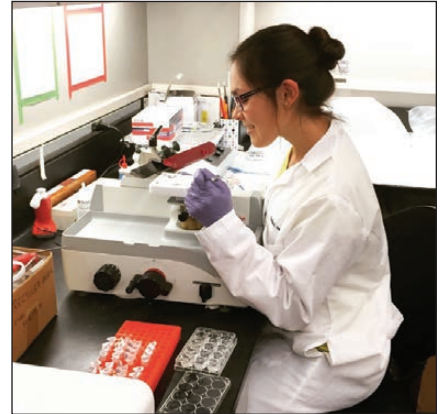


a range of disciplines from both UC San Diego and universities around the world. In my opinion, the biggest strength of the Specialization—and the field of Anthropogeny—is that it constantly endeavors to bring the social sciences and sciences together into an interdisciplinary exploration of human origins and evolution, and draws on the individual strengths and discipline-specific knowledge of its students and faculty to create a rich collaborative environment for all of its members.

One of my favorite parts of the Specialization was monthly Research Rounds, where I was encouraged to look for articles that were far outside my area of focus, and even outside of my discipline. The discussions held during these meetings were some of the most enlightening and entertaining experiences of my graduate school career! Finally, the summer trip to Africa was a once in a lifetime experience, and I will always be grateful to the Specialization for the incredible adventure. The most memorable experiences from that trip were the days spent tracking chimpanzees in the Gombe National Park, our visit to Olduvai Gorge, and visiting the Hadzabe in Tanzania. The trip was exemplary of everything the Specialization stands for: a multidisciplinary exploration, drawing on many different lines of evidence, of how we became human.

Caroline Horton, Anthropology

My most memorable Anthropogeny experience was a constellation of moments during the Field Course, an incredible trip that, as a biological anthropologist and a *Homo sapien*, not only carried significant personal meaning for me (never would I have dreamed in my undergraduate paleoanthropology classes that I would one day be in the same room as the original Lucy remains, observing them from the distance of a mere few inches!), but also put human origins into a first-hand perspective that I will carry with me throughout my career and my lifetime.



My research interests lie in the evolutionary changes in human neuroanatomy that underlie uniquely human sociality, but it was not until my experiences in Tanzania, where I experienced the interaction of habitat and social structure in very different primate species, that I critically grasped sociality as an adaptation to environment.

The most significant takeaway I've received as an Anthropogeny Specialization student is the great power in studying the human species at multiple levels of analysis, from the molecular and anatomical to the cognitive and cultural. I have been exposed to diverse research that directly informs the bigger picture questions of my own work, and have had the opportunity to discuss my research with several high-impact scientists and researchers from a wide array of disciplines who speak and attend the CARTA symposia.

The conceptual framework I've developed as an Anthropogeny student is imperative to my field, as the rapid evolution of neural systems involved in the socio-cognitive abilities unique to humans is thought to possibly contribute to modern human susceptibility to neurodevelopmental and mental health disorders. I have no doubt that the intellectual tools I've gained from this evolutionary perspective in my academic training will aid me in developing novel hypotheses throughout my career in mental health and neurodevelopmental disorder research.

Interested in learning more about human origins?

All past CARTA symposia are viewable online at:
https://carta.anthropogeny.org/symposia/past_list

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Corinna Most, Anthropology

As a primatologist, visiting Gombe, during the Anthropogeny Field Course, was a dream come true. Even after spending a year studying baboons in the Kenyan bush, I wasn't prepared for the emotional punch of seeing my first wild chimp.



The obstacle-course-like nature of the trek only increased the excitement, as we squeezed through a tunnel of roots and fallen branches expecting to find chimps just on the other side. And the hours of walking on sandy, hilly terrain were all made worth it when we found the large group we were tracking, and got to sit in the shade with them as they rested.

But the most memorable moment was staying completely still as a belligerent male suddenly rushed into the group and scattered all of the other animals, who ran right towards us – and then past us, completely ignoring us as we sat motionless and just a tiny bit scared.

My research on the development of social skills in infant baboons was, from its inception, a comparative endeavor, as I use theories and methods from a wide variety of fields: cultural and biological anthropology, of course, but also developmental psychology, cognitive science, and education studies. However, being a student in the Anthropogeny Specialization Track opened my eyes to how much broader my comparative scope needed to be if I wanted to say something meaningful about human evolution. From sialic acids to ritual behavior, from neuronal cytoarchitecture to organized warfare – understanding what it means to be human requires the contribution of more disciplines than I had imagined.

But one topic kept recurring – the environment. Ecological changes, both on the long- and the short-term, have almost certainly had a strong effect on hominin evolution. This led me to modify my initial research question from simply focusing on the social factors influencing infant development, to expanding my focus to the ecological context. By examining how local environmental factors interacted with the social ones, I was able to achieve a more complete understanding of the context in which the infants developed and to begin to unravel the dynamic relationship between individual behavior and the larger socio-ecological background it takes place in. Ultimately, while the forest-dwelling chimps were exciting, I think understanding these processes in the savanna-dwelling baboons can ultimately shed more light on our understanding of hominin evolution.



Check out the CARTA bumper video!
<http://carta.anthropogeny.org/donate>

Andrew Schork, Cognitive Science

As a scientist, I strive to be a skeptic. I resonate with the sentiments of Dan Dennett (or was it Rose Kennedy? The internet evidence is not unambiguous) who said, "There's nothing I like less than bad arguments for a view I hold dear." On the one hand, there is what we want (feel) and on the other what we know (think), what we can prove. When they are inconsistent, I find myself swirling with discontent until a resolution presents itself, with clearly described methods, and is replicated. Perhaps these sentiments are why one particular moment during my training in the Anthropogeny Specialization Track stood out more than others...

We sat nestled into the dry jungle underbrush, halfway up the eastern sloping shores of Lake Tanganyika, observing nursing, feeding, playing, hooting, drumming, napping and all things *Pan troglodytes*.

"Ouch" I mumbled, trying to stay composed, trying to keep my Zen. My mind began to drift. For the past two minutes, I had been confidently demonstrating that Zen was the best tactic for inspiring disinterest from bees, in part, I mused, as a chivalrous exemplar, an easer of tension among my disquieted colleagues.

Now I had my sweaty T-shirt peeled halfway up and sat thumbing my belly, hunting for a stinger. Silently, I enjoyed the irony. I wondered how Jane Goodall dealt with the bees. I was, after all, in Gombe. I had, after all, read *Through a Window*, describing her thirty years of research in the same park, on the same chimpanzees. I read it with my usual skepticism, of course, intrigued by what I construed as an anthropomorphism in her recounts, but here I was, trying to understand.

"Watch out," Fiona said as, I assumed, she rustled towards me to change her vantage point.

I looked up and was met by two dark eyes that were decidedly not Fiona's. Gimli, a young male chimpanzee filled her place. When our eyes met, there was a single moment, an - I believe - shared acknowledgement of something that caught us both off guard. We both recoiled, mouths agape but covered with an arm, each letting out something between high pitch shrill and a scream.



Then the moment was over, the connection was gone. As Gimli retreated up a tree, I curled into the fetal position and, because of Richard Wrangham's *Demonic Males*, feared I would soon be disconnected from my unborn children. Did I anthropomorphize Gimli? I felt something but I had no idea how to think about it. The indigestion of discontent brewed.

"Andrew," our mentor coached, "that was a highly suboptimal response."

"It was, Pascal," I said. "*On many levels*," I thought.

What happened? Eighteen months later I'm still not sure, but I remain curious.

For me, this is the essence of the Anthropogeny Specialization. We chase questions about the origins of our humanity, pursuing the deeply philosophical, the ethereal, but we yearn for answers that are juxtaposed by their concreteness. There is no clear path to follow, perhaps it doesn't even exist, but we press on, urged forward by the experiences and ideas that make us the most divided, most uncomfortable, most inspired.

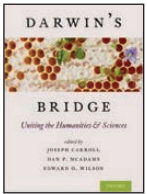
CARTA-Inspired Publications

Transdisciplinary interaction is at the core of CARTA's mission to advance human origins research. CARTA symposia provide a forum for experts from vastly different fields to share knowledge and work together to spark new research. The following is a selection of publications inspired by interactions amongst CARTA members (**in bold**) and facilitated by CARTA. (Complete list at the [CARTA website](#).)



Baird, A, et al. Up-regulation of the human-specific *CHRFAM7A* gene in inflammatory bowel disease. *BBA Clinical*. 2016: June: 66-71.

We explored whether the pro-inflammatory & uniquely human *CHRFAM7A* gene is elevated in inflammatory bowel disease (IBD). We report that *CHRFAM7A* is increased, and its target *CHRNA7* decreased, in colon but not small intestine. This uniquely human gene may contribute to the etiology of human ulcerative colitis, a finding that implies that certain forms of inflammatory disease may be human-specific.



Boehm, C. Bullies: Redefining the Human Free-Rider Problem. In: Carroll, J, McAdams, D, Wilson, EO, eds. *Darwin's Bridge: Uniting the Humanities and Sciences*. 2016: 384.

Bullying involves unwanted domination, and subordinates may retaliate. Such retaliation is found in humans, bonobos, and chimpanzees, and in hunter-gatherers it becomes definitive in the form of egalitarianism. In larger societies, subordinates may gain considerable power over their leaders, while leaders also may become despotic. These varying outcomes stem from the same human political nature.



Bregman, MR, **Patel, AD**, Gentner, TQ. Songbirds use spectral shape, not pitch, for sound pattern recognition. *Proc Natl Acad Sci U S A*. 2016;113(6):1666–1671.

Songbirds are often considered nature's most musical creatures, but how does their perception of melodies compare to ours? It has long been believed that birds recognize melodies on the basis of absolute pitch. This study suggests that birds do not actually use pitch to recognize melodies. Instead, they use changing spectral patterns, more akin to how humans recognize speech.



Bruner, E, **Preuss, TM**, Chen, X, **Rilling, JK**. Evidence for expansion of the precuneus in human evolution. *Brain Struct Funct*. 2016:1–8.

Modern humans and Neanderthals have brains of similar size, but different shape, due in part to bulging of the human parietal region. Quantitative comparison of human and chimpanzee cortex reveals specific expansion in human evolution of the precuneus, the medial part of the parietal lobe. The precuneus is part of a cortical network involved in self representation and social cognition.



Collard, M, Wood, B. Defining the Genus *Homo*. *Handbook of Paleoanthropology*. Springer; 2015: 2107–2144.

The definition of genus *Homo* is an important but under-researched topic. In this paper, CARTA members Mark Collard and Bernard Wood show that interpretations of *Homo* have changed greatly over the last 150 years as a result of the discovery of new fossils and functional analyses of existing specimens. Collard and Wood go on to argue that three of the species currently assigned to *Homo*, *H. habilis*, *H. rudolfensis*, and *H. floresiensis*, should be assigned to different genera.



Cvencek, D, Greenwald, AG, Meltzoff, AN. Implicit measures for preschool children confirm self-esteem's role in maintaining a balanced identity. *Journal of Experimental Social Psychology*. 2016;62:50–57.

A distinctive aspect of human consciousness is our thoughts and feelings about our "self." We developed a new technique to examine self-esteem in young children. Self-esteem is central to maintaining a sense of who you are and is a foundation for forming in-group vs. out-group affiliations. Children often fail in trying to learn new things (from math to art); self-esteem prevents a feeling of helplessness and supports persistence in learning efforts—a key to success.



de Menocal, PB. Palaeoclimate: End of the African Humid Period. *Nature Geoscience*. 2015;8(2):86–87.

Between 15-5 thousand years ago, the vast Sahara desert was nearly completely vegetated with large permanent lakes, abundant grassland fauna, and bands of hunter-gatherer and pastoralist human populations. While it is well known that this was due to orbital insolation forcing of the African monsoonal rains, a new study shows that onset and end of this humid phase was time-transgressive with latitude, consistent with orbital theory.



Fedorenko, E, Varkey, R. Language and thought are not the same thing: Evidence from neuroimaging and neurological patients. *Annals of the NY Academy of Sciences*. In Press

Is thought possible without language? In spite of their loss of language, individuals with global aphasia can solve math and logic problems, reason about others' beliefs, and appreciate music. Further, neuroimaging studies show that healthy adults do not use their language areas for non-linguistic tasks. Thus many aspects of thought engage distinct brain areas from, and do not depend on, language.



Franchini, LF, **Pollard, KS**. Genomic approaches to studying human-specific developmental traits. *Development*. 2015;142(18):3100–3112.

This paper reviews how comparative and functional genomics have illuminated the uniquely human parts of our DNA, including both gene coding sequences and non-coding regulatory elements. New technologies are revealing causal links between human traits and these human-specific sequences.



Haide, MN, et al, including **Collard, M**. The Nature of Culture: an eight-grade model for the evolution and expansion of cultural capacities in hominins and other animals. *J Anthropol Sci*. 2015;93:43–70.

In this paper, an interdisciplinary team of scientists that includes CARTA member Mark Collard present a conceptual model that attempts to map the expansion of cultural capacities during human evolution. The model features eight "grades." Some of these are shared widely among animals. Others are shared only with just a few mammal species. Still others are unique to hominins. The team hope that their model will provide a point of departure for further investigation.



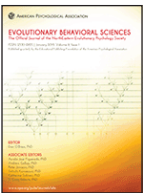
Hawkes, K. Genomic evidence for the evolution of human postmenopausal longevity. *Proc Natl Acad Sci U S A.* 2016;113(1):17–18.

Female fertility ends near the same age in humans and chimpanzees, while only women can stay productive decades longer. Schwarz et al. 2016 *PNAS* bring the first genomic evidence to bear on the grandmother hypothesis to explain this. Examining the history of alleles of CD33, they find that the one protective against late-life dementia is derived in humans, indicating past selection for competence at older ages.



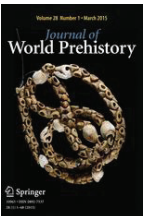
Hewlett, BS, Roulette, CJ. Teaching in hunter-gatherer infancy. *R Soc Open Sci.* 2016;3(1):150403.

A debate exists as to whether teaching is part of human nature and central to understanding culture or whether it is a recent invention of Western culture. It is important to understand whether or not teaching exists cross-culturally because some suggest that teaching is a key cognitive ability that enabled humans to develop cumulative culture and adapt to environments around the world. The study examines teaching among an African forager group and finds evidence for several types of teaching.



Karthikeyan, S, Locke, JL. Men's evaluation of women's speech in a simulated dating context: Effects of female fertility on vocal pitch and attractiveness. *Evolutionary Behavioral Sciences.* 2015;9(1):55-67.

In human evolution, both language and song presuppose development of vocal control. In a simulated dating context we found that the pitch of young women's speaking voices dropped significantly during the high fertility phase of their menstrual cycle, and that young men preferred this lowered voice, suggesting that vocal control may have emerged, in part, in the context of mate selection.



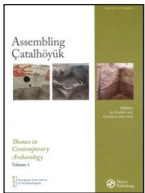
Larsen, CS, et al, including Ruff, CB. Bioarchaeology of Neolithic Çatalhöyük: Lives and Lifestyles of an Early Farming Society in Transition. *Journal of World Prehistory.* 2015;28(1):27–68.

Study of human remains from Çatalhöyük, one of the first large, agglomerated settlements in western Asia, provides a fundamental record of biological relationships, health, dietary reconstruction, mobility, and activity. This study provides among the first major syntheses of what life was like in a setting involving increased sedentism, population growth, and reliance on domesticated plants.



O'Shannessy, C. Multilingual children increase language differentiation by indexing communities of practice. *First Language.* 2015;35:305–326.

How do languages become more differentiated from each other? In a small-scale community, where everyone is multilingual, different ways of speaking can index specific, yet over-lapping, identities. In the context of this paper, multilingual children speak in ways that index the identities they want to highlight, and this may lead to their languages becoming more distinct, in systematic ways.



Sadvari, JW, including Ruff, CB, Larsen, CS. Roles for the Sexes: the (Bio)archaeology of Women and Men at Çatalhöyük. In: Hodder, I, Marciniak, A, eds. *Assembling Çatalhöyük.* Oxford: Oxbow Books; 2015: 87–95.

Human remains from Çatalhöyük, an early city in south-central Turkey (7100-6000 BC), provide a record of differences between men and women in their social roles in this early Neolithic community. Multiple indicators of diet, health, activity, and lifestyle present a picture of life and living in a challenging setting when people first became farmers and lived in permanent settlements.



Tocheri, MW, et al. The evolutionary origin and population history of the grauer gorilla. *Am J Phys Anthropol.* 2016;159(Suppl 61):S4–S18.

Using morphological, genetic, biogeographical and paleoenvironmental evidence, the authors articulate a founder-effect hypothesis for the origin of the grauer gorilla. Their results suggest that the grauer lineage originated from a small founding population of eastern gorillas ~10,000 years ago, offering some optimism for efforts to save critically endangered eastern gorillas from extinction.



Toft, CA, Wright, TF. *Parrots of the Wild: A Natural History of the World's Most Captivating Birds.* Oakland, CA: University of California Press; 2015.

The authors explore the evolutionary history of parrots and how this history affects perceptual and cognitive abilities, diet and foraging patterns, and mating and social behavior in this group. It concludes with a discussion of behavioral and cognitive parallels between humans and parrots.

CARTA Member Awards and Honors

The following awards and honors were received by CARTA members during the past year.

Andrew Baird: Elected President, Wound Healing Society.

Barry Bogin: Elected Honorary Treasurer, Society for the Study of Human Biology.

Jean-Pierre Changeux: Italian Society for Neuroethics Award Medal, 2015; The International Research Award in the Field of Medicine and the Natural Sciences, Olav Thon Foundation, 2016; Doctor honoris causa, University of Chile, 2016.

Mark Collard: Elected Fellow of the Society of Antiquaries of London, the main honours in archaeology.

Fred Gage: Jakob Herz Prize, 2016; Elected to National Academy of Sciences Governing Council.

Katie Hinde: The Ehrlich-Koldovsky Early Career Award, International Society for Research in Human Milk and Lactation, 2016.

Nicholas Humphrey: Associazione Mente e Cervello Mind and Brain Prize, 2015.

Rob Knight: Vilcek Foundation Prize, 2015.

John Locke: Honors in Communication Science and Disorders from the American-Speech-Language-Hearing Association, 2015.

Terry Sejnowski: Fellow, American Physiological Society, 2015; Life Fellow, Institute of Electrical and Electronics Engineers, 2015; Swartz Prize for Theoretical and Computational Neuroscience, Society for Neuroscience, 2016.

Stephen Stearns: Honorary Doctorate by the Faculty of Science and Mathematics, University of Zurich, 2015.

Michael Tomasello: 2015 Distinguished Scientific Contribution Award, American Psychological Association.

Student News

Corinna Most (pictured right), a CARTA Fellow and an Anthropogeny Specialization student, has been selected to teach the 2016 Summer Session of **ANBI 116 - Human Sexuality in an Evolutionary Perspective**.

This course examines the biology and psychology of human reproduction, sexuality, mate preference, and family structure from a comparative, cross-cultural, and evolutionary perspective. The class will be structured as a seminar, and they will debate topics such as the evolutionary origins of menopause, the reasons for infanticide, the biological and cultural aspects of attractiveness, and what the 'natural' human mating system might be.

Corinna, who is also a doctoral candidate in the Department of Anthropology at UC San Diego, said "Being a member of the Anthropogeny Specialization and attending both the symposia and our more informal discussions has given me a much greater insight into the debates surrounding the evolution of human sexuality, from the role our loss of body hair played in pair-bonding (**Unique Features of Human Skin**) to the importance of grandmothers in human evolution (**Birth to Grandmotherhood: Childrearing in Human Evolution**). I am excited to delve into these topics with my students!"



A topic covered in this course is the evolution of sexual ornaments, such as the human beard

CARTA Symposia Schedule

Ancient DNA and Human Evolution
April 29, 2016, Salk Institute

Implications of Anthropogeny for Medicine and Public Health
October 14, 2016, UC San Diego

Awareness of Death and Personal Mortality: Implications for Anthropogeny
Winter 2017, Location TBD

Extraordinary Variations of the Human Mind: Lessons for Anthropogeny
Spring 2017, Location TBD

CARTA on the Web



Want to re-watch a CARTA symposium? All symposia, including "**Origins of Genus Homo**" (February 2016), are available at the above websites.



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What is CARTA?

The UC San Diego/Salk Institute Center for Academic Research and Training in Anthropogeny (CARTA) is dedicated to answering the age old questions "where did we come from?" and "how did we get here?" As CARTA explores the origins of humanity, we are not only answering philosophical and existential questions, but also addressing very practical issues concerning human nutrition, medicine, mental disease, the organization of society, the upbringing of our young, and the interactions of humans with one another and with our environment. Transdisciplinary interaction is at the core of CARTA's mission to advance human origins research.

For more information, please visit <https://carta.anthropogeny.org>

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