

### The human capacity for imagination

allows us to conjure limitless possibilities in the abstract realm of our minds. We can create fantastic and wondrous universes, like the aquarium above. Or we can mentally time travel, perhaps to reconstruct an extinct hominin such as the *Homo floresiensis* depicted at left by the Kennis brothers.

Evolutionarily, imagination may have helped our ancestors to perform complex tasks like decision making, innovating technology, living in complex societies, running problem-solving simulations, telling compelling stories, and engaging in theory of mind to understand others.

We encourage imagination in children as a way to develop cognitive capabilities, and as we grow older

*Continued inside...*

### Inside this Issue...

CARTA  
Symposium

Centennial  
Issue of AJPA

Ask an  
Anthropogeny  
Expert

2018  
Anthropogeny  
Graduates

CARTA-  
Inspired  
Publications

CARTA  
Member  
Awards &  
Honors

# CARTA Symposium: *Imagination and Human Origins*

*Continued from cover...*

we use and depend on our imagination in our daily lives. Each of us spends a large amount of time in our own particular universe of infinite, imagined possibilities. Without a doubt, imagination was key to creating the cultural niche our species now inhabits.

In CARTA's **Imagination and Human Origins** symposium, we will explore imagination as a distinctly enhanced human ability along with how and why this capacity evolved in our lineage. Discussions will include the impact of imagination on the arts and sciences, the consequences of imagination impairment, and the fundamental genetic and neurological basis of human imagination.

Each CARTA symposium is free and open to the public and features experts who present on topics addressing the origins of the human phenomenon.

If you're curious about where we came from and how we got here, consider attending one of our events.

For more information on this symposium, to register, to watch the live webcast, or for information on past and future events, please visit:

<https://carta.anthropogeny.org/symposia>



**Center for Academic Research and Training in Anthropogeny**

*"to explore and explain the origins of the human phenomenon"*

University of California, San Diego • 9500 Gilman Drive, MC# 0060 • La Jolla, CA 92093

<https://carta.anthropogeny.org>

UC San Diego



**Friday, June 1, 2018**

1:00 - 5:30 pm (Pacific)

Conrad T. Prebys Auditorium, Salk Institute

**FREE ADMISSION!**

**LIVE WEBCAST!**

**Co-Chaired by**

Sheldon Brown, UC San Diego  
& Alysson Muotri, UC San Diego

Featuring the following talks and speakers

***What is Imagination?***

Sheldon Brown, UC San Diego

***Dream It, Be It: How Imagination and Creativity  
Reshaped Human Evolution***

Agustín Fuentes, University of Notre Dame

***Thinking about the Possible: Imagination and  
Learning in Early Childhood***

Caren Walker, UC San Diego

***The Origins of Human Imagination and How  
Technology Enhances Our Imagination***

Lyn Wadley, University of the Witwatersrand

***Human Society as a Consequence of  
Human Imagination***

Maurice Bloch, The London School of Economics and  
Political Science

***Building Complex Knowledge with Language  
and Imagination***

Lera Boroditsky, UC San Diego

***Imagining Society: The Art of Firelight Stories***

Polly Wiessner, University of Utah/Arizona State University

***Using Imagination to Create Reconstructions of  
Ancient Hominins***

Adrie and Alfons Kennis, Kennis and Kennis  
Reconstructions

***Reconstructing the Neanderthal Mind in a Dish***

Alysson Muotri, UC San Diego

This symposium is presented by

**UC San Diego/Salk Institute Center for Academic  
Research and Training in Anthropogeny (CARTA)**

And made possible by support from

**The G. Harold and Leila Y. Mathers Charitable  
Foundation and The Paul G. Allen Frontiers Group**

## **CARTA Members Contribute to Centennial Anniversary Issue of *American Journal of Physical Anthropology***

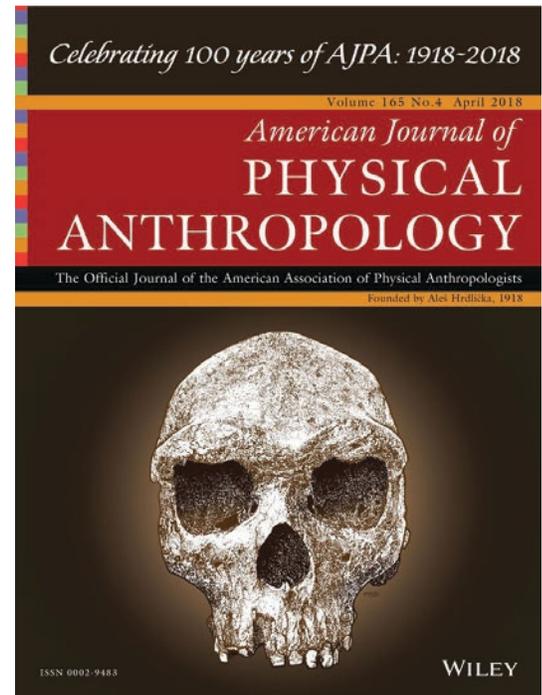
From the Centennial Perspective by Michael A. Little (Binghamton University): “In 1918, the first issue of the *American Journal of Physical Anthropology (AJPA)* was prepared and distributed by Aleš Hrdlička, the Curator of Physical Anthropology at the Smithsonian Institution. This was a singular act, both in the general and specific sense. It was the first journal of physical anthropology published in the United States...On this 100th anniversary of the founding of the journal, Hrdlička’s efforts were successful: physical/biological anthropology is a strong and timely discipline that represents a major area of scientific research today”.

To celebrate this milestone, Peter T. Ellison (Harvard University) invited his predecessor Editors-in-Chief of the *AJPA* to join him in assembling a special, centennial issue. “The result is a wonderful collection of essays that not only look backward on the development of the discipline of physical anthropology, but forward to its future.”

Not surprisingly, several of the contributing authors to the April 2018 Centennial Anniversary Issue are CARTA members, whose chapters are:

- A sort of revolution: Systematics and physical anthropology in the 20th century. (**Matt Cartmill**)
- Functional morphology in the pages of the *AJPA*. (**Christopher B. Ruff**)
- Hunter-gatherer studies and human evolution: A very selective review. (**Kristen Hawkes**, James O’Connell, **Nicholas Blurton Jones**)
- Human life course biology: A centennial perspective of scholarship on the human pattern of physical growth and its place in human biocultural evolution. (**Barry Bogin**, Carlos Varea, Michael Hermanussen, Christiane Scheffler)
- Bioarchaeology in perspective: From classifications of the dead to conditions of the living. (**Clark Spencer Larsen**)
- Race, then and now: 1918 revisited. (**Rachel Caspari**)

# Centennial Issue: *American Journal of Physical Anthropology*



## Ask an Anthropogeny Expert

Are you chewing on a particular and ponderous problem related to anthropogeny? Perhaps you're cogitating on where we came from and how we got here.

Propose your question to us and we'll recruit experts to weigh in and provide brief, but informative, answers to selected questions, to be featured in a future CARTA newsletter.

Email questions to [carta-info@anthropogeny.org](mailto:carta-info@anthropogeny.org)

# 2018 Graduating Class: Anthropogeny Specialization Track Students

This spring, six students will successfully complete the Graduate Specialization in Anthropogeny requirements and will add a parenthetical degree in Anthropogeny to their respective Ph.D.s. (in progress). To celebrate this achievement, we have shared the students' reflections on their participation in the Specialization. A hearty congratulations goes out to the 2018 Anthropogeny graduates!

## Matt Boisvert (Neuroscience)

I entered the Anthropogeny Specialization Track excited to be asking the question, "What makes humans special?," convinced that this was answerable if I spent a couple years thinking hard. This question was quickly replaced in my mind by "Are humans special?" The more I learned and experienced through the Specialization, the less I was confident the answer was an easy "yes." Being comfortable in this ambiguity and lack of easy answers is one of the most valuable lessons I will take from my Ph.D. training. The ability to extract what you can from an opaque record and put it in context with more information, that seemingly just confuses things further, and to be okay (thriving even) with this, is another. Both are true of science as whole, and the Specialization was invaluable in teaching me this.

Some of my favorite moments came seemingly out of nowhere. Conversations going around the Specialization office table tend to take unexpected turns, from dissecting the particulars of some esoteric human behavior (mostly in the vein of "Is x thing really hominin specific? Maybe."), into something more, getting into the nature of life or consciousness or something Big in a roundabout way, via an in-depth discussion of the facts on the ground combined with a healthy smattering of anecdote. In an abstract, overarching sense, these discussions are what made the Specialization a great experience for me, but for specific highlights, nothing can come close to the field course. Over the course of a few weeks, I was able to better conceptualize the origins of man, parlaying formerly abstract discussions into a better understanding of where humans came from. Being surrounded by megafauna in Ngorongoro Crater, each inhabiting its own highly developed, specific niche, and imagining how humans too once fit into their own niche, led to my thoughts a short

time later, waking up on a rock in Hadzaland. With the sunrise silhouetting baobab trees, I saw here humans still inhabit this niche, however fragile it remains. From there, being within a group of chimps, surrounding us in all directions, including up (which proved somewhat hazardous due to the by-products of chimp metabolism), interacting with each other and foraging, I came to a rather clichéd realization that chimps are people too, almost, inhabiting a not dissimilar place in the world until not too long ago.



*Matt at the floor of the Eastern Rift Valley, Tanzania.*



*"Dancing" for a chimpanzee in Gombe Stream National Park, Tanzania.*

## Alie Caldwell (Neuroscience)

I came to UC San Diego to study Neuroscience, because I was drawn to the ways science is seeking to answer questions about the brain, and what our brains and those of other species tell us about what it means to be human. Generally, though, Ph.D. students - like me - are focused on trying to answer small, specific questions; trying to find one piece in a larger puzzle. When Dr. Pascal Gagneux came to speak to my grad program about the Anthropogeny Specialization and CARTA and its goals, I saw the opportunity to participate in a program that would help me contextualize my own research and let me step outside of my tiny corner of science to think about and discuss these larger questions. My work studying genetic neurodevelopmental disorders in mice forces me to grapple with the ethics of trying to “cure” diseases that cause intellectual disability when “normal” is a nebulous concept at best. I’ve enjoyed being part of the Specialization community and thinking about what’s gotten humans to where we are, to help me think about where we might go in the future.

Beyond the intellectual stimulation and opportunities to meet accomplished researchers, being part of the Specialization has also just been a great deal of fun. The Specialization student program organizers put a great deal of effort into organizing events where we can socialize with a taste of our history - enjoying homemade bread and beer, pig roasts over an open fire and carved with obsidian knives, and horseback riding are just a few examples of things we’ve had the chance to do right here in San Diego. Of course, few experiences in my life can compare with the opportunity to travel to Ethiopia and Tanzania as part of the field course. Spending three weeks visiting sites that carry so much history

and weight in the study of human origins was incredible. I especially appreciated the chance to see and contrast the issues and tensions facing modern Tanzanians - the government, farmers, pastoralists, and Hadza hunter-gatherers - with what we’ve learned from studying our closest non-human relatives (chimpanzees) and the fossils of our ancestors.



*Posing with an elephant femur at Camp Simba, Ngorongoro Crater rim.*



*Learning the art of shooting a Hadza arrow, Hadzaland, Tanzania.*

## Kyle Fischer (Neuroscience)

I didn't end up pursuing a Ph.D. in Neuroscience developing molecular tools for neural circuit mapping because as a child I had a deep fascination with designing PCR primers, running gels, or repetitively moving tiny yet precise amounts of liquid from one tube to another. No, I ended up where I am today because I was inspired by much bigger questions, about who I was, who we are, and how we became what we

are today. While I have cherished the privilege I have had as a graduate student at UC San Diego to develop as a scientist, the minute, tedious, and often technical nature of science can distract from these big questions, and the inspiration, that lead me to the field. Without that inspiration, it's easy to forget what the effort is for in the first place.

*Continued on the next page...*

*Continued from the previous page...*

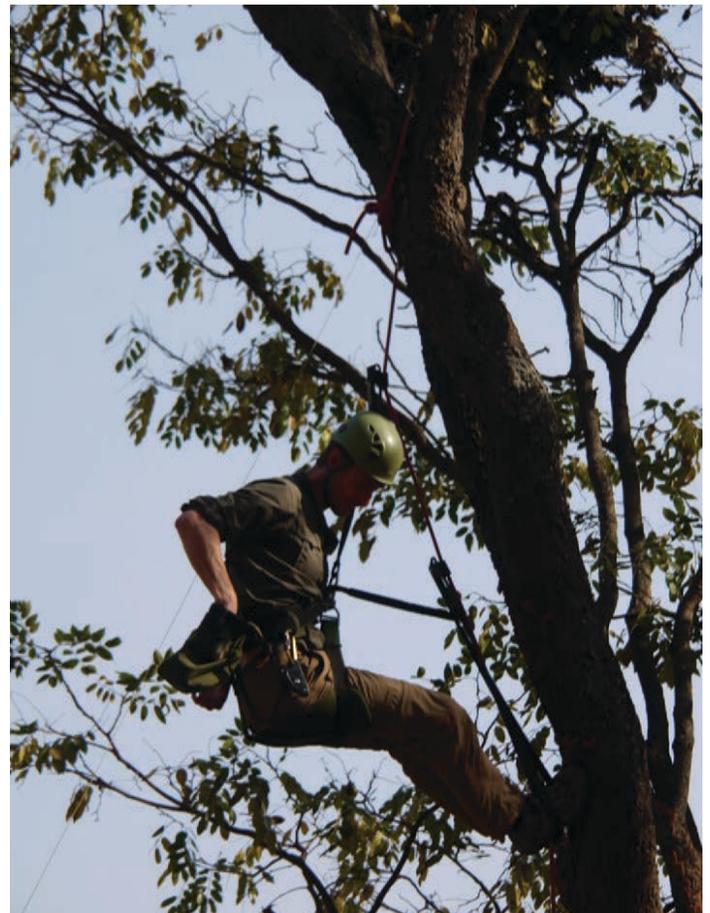
The whole CARTA experience, from the in-depth and diverse conversations held at research rounds, to hosting and dining with seminar speakers, to hunting with the Hadza during the field course, not only reintroduced me to a childhood wonder that brought me to the sciences but also rekindled a dwindling reserve of drive and changed how I look at my research. In the third year of my program, when much of my research work was providing sparse returns, having the Specialization program was a shining light in what, at the time, was an otherwise bleak graduate student landscape. While I had at one time seen my work as very distant from human origins and the work of my anthropogeny colleagues, subjects discussed in our courses and seminars led me to appreciate how important my work in understanding neural connectivity was to understanding human evolution. These discussions and experiences also revealed great



*Kyle in Hadzaland, Tanzania, after a successful hunt with the Hadza.*

bodies of knowledge I was deeply ignorant of, and in turn to new scientific horizons we collectively know very little about, realizations that have informed what I now think are the big unanswered questions in my field and changed the trajectory of my research.

I wish I could impart here the full measure of the Specialization's importance on my career as a scientist, but cannot, nor think I ever will be able to, as I have yet to find out where the friendships, discussions, and experiences CARTA provided will ultimately take me.



*Climbing a tree to examine a chimp nest in Ugalla, Tanzania.*

### **Stephen Johnston (Neuroscience)**

I joined the Anthropogeny Specialization (CARTA) a little bit by design and a little bit happenstance. By the end of the introductory course, my curiosity and intellectual interest was hooked. However, it was the people and my interactions within the specialization – from Pascal Gagneux first inviting me over to his house for lunch to convince me to join the program, to the students and faculty at the monthly journal clubs and tri-annual symposia—that made the

experience a formative one.

CARTA presses us to answer the questions, “Where did we come from? How did we get here?” However, in the study of human evolution, answers aren't easy to come by: the ‘fossil record’ is fragmented and incomplete. The study of human origins is a search of puzzle pieces, from the relatively few individuals whose fossilized

*Continued on the next page...*

*Continued from the previous page...*

remains we have—imagine trying to reconstruct 7 million years of family history with only 100 individuals—to the “fossilized” remains left in the living (our genomes, the proteins and molecular machines that ensure our bodies function, our behaviors), obfuscated signatures of the past, edited, erased, and written over again and again. To answer these kinds of questions, CARTA’s approach is to foster dialog.

The public face of this dialog are the celebrated CARTA symposia. But it’s outside of these symposia—in the journal clubs, social gatherings, hosting of symposia speakers, and just bumping into frenetic conversations with fellow CARTA professors and trainees around campus—where this dialog shines. Bringing people together across disparate fields, I vividly remember Dr. Ajit Varki and Dr. Pascal Gagneux fighting against the dispersion of Babel, encouraging (and admonishing) us all to avoid jargon, “Anytime you use technical language, explain yourself!,” and then serving as translators to the public and between ourselves when we failed. It was among these conversations that I found not only a group of colleagues—brilliant, creative people, interested, diving-in and tugging on strings—but friends. When I look back to my experience in

the Specialization, it’s this human experience I remember most: a passionate group of people exploring their family tree, encouraging the freedom to question, demanding the rigor to work out a thought or question, and hoping to shed new light on old bones.



*Stephen learning to make friction fire in Hadzaland, Tanzania.*



*In the highlands of Ethiopia.*

### **Sara Goico (Anthropology)**

As part of the Specialization program, students have the incredible opportunity to participate in a three-week field school in Tanzania. One of the activities during the field school is a visit to the Hadzabe, a hunter-gatherer people that live along Lake Eyasi.

Before arriving at the Hadzabe campsite among the students and faculty, we discussed whether we would share our meals with the Hadzabe. The general practice was for tourists and the Hadzabe to separately eat their own food. This was a tradition that the Specialization did not participate in because during the first years of the program an anthropologist who worked with the Hadzabe had been on the trip. This was the first year she was not one of the faculty members and so it was rather ambiguous whether or not we should share our meals. We decided to give it a shot nonetheless.

But our first meal together definitely felt awkward. We were sitting together around their campfire, but in completely separate groups having our own conversations. To break some of the tension that at least I felt, at the end of the meal, I scooped closer to a woman, Mongo, who had helped break the ice when we first arrived. I didn’t speak any Hadzabe or Swahili and she didn’t speak any English, so I decided to try sign language instead. I began pointing to things around us and showing her the signs in American Sign Language and she began translating into Hadzabe. We quickly had a lot to say that we could not communicate through pointing. I called over one of the faculty to translate and soon the other CARTA students were gathered around.

Mongo was one of those individuals who Haviland (2004) calls a master speaker. She shared with

*Continued on the next page...*

*Continued from the previous page...*

us stories about her life and how she grew up. Her mother's name was also Sara, she told me, and so she began jokingly calling me mother. She also asked us about how we lived. She was not shy about telling us how skeptical she was that we didn't know how to build our own houses or gather our own food. "What did your parents teach you, if they didn't teach you those basic things?" she asked us.

As I reflect back on the experience of meeting Mongo, more than anything else I am truly awed by the power of language. As academics try to understand the human capacity for language, we continuously remove it from social life and study it as isolated structures and utterances. I do not believe that we can understand language in that way. What moments such as those with Mongo show is how language is a tool for connection between individuals.

Haviland, JB. Evidential mastery. In *Proceedings of the 38th Annual Meeting of the Chicago Linguistic Society*. 2004;348-368.



*Sara somewhere tropical...*



*Learning how to fletch an arrow (whittled Grewvia branch) using chewed animal sinew, and Guineafowl feathers.*

### **Landon Klein (Neuroscience)**

When I first entered the Anthropogeny specialization, I expected to learn about the origins of humanity through archeology, phylogeny, comparative biology, anthropology, ecology, and the like. I had been slogging through the minutia of neurochemistry and wanted both an outlet for intellectual escapism and a broader context in which to place my research.

CARTA filled both of these niches to a tee. But along with an understanding of our oldest ancestors, our earliest behaviors, and our monumental diaspora to conquer the globe, I learned about what it means to be a modern human in our modern world. I spent weeks delving into the characteristics that make humans unique, and the ways in which we at times overstate our exceptionality. I traveled throughout eastern Africa, seeing the fertile grounds from which we emerged, yes, but also experiencing the amazing diversity of human cultures, from the daily lives of Hadza hunter-gatherers to the unusual social norms of the elusive field primatologists at the Ugalla Primate Reserve.

Most importantly, I learned the capability we as humans have for curiosity, for deductive reasoning, for learning, understanding, and communication. I learned that despite the often daunting quantity of open questions, humans have not only mastered an unbelievable potpourri of academic pursuits, but have excelled at the ability to effectively convey this information to one another.

I learned all of these things from the incredible students, faculty, and administrators with whom I was lucky enough to share my time at myriad research rounds, symposia, field excursions, and strangely-themed celebrations. Each CARTA event left me inspired by the insight of my peers, and the ways in which their backgrounds, unique from my own, colored the same information with a completely different pallet, producing through discourse a beautiful technicolor portrait of human accomplishment.

I am incredibly grateful for the opportunity to  
*Continued on the next page...*

*Continued from the previous page...*

learn from Pascal and the brilliant Anthropogeny faculty, and equally grateful for the chance to engage with the most impressive, intellectually curious, quick-witted, and downright interesting students I've ever had the pleasure of meeting. Spending my days toying with microscopic

chemicals and receptors, it was easy to forget the wonder and grandeur of living each day as a member of this strange species of brainy apes. I owe a huge debt of gratitude to CARTA for continually reminding me of this, and I will carry these lessons with me for the rest of my life.



*Digging for tubers with the Hadza in Hadzaland, Tanzania.*



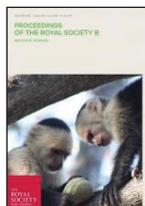
*Landon, second from left, during a lesson in the Ngorongoro Crater, Tanzania.*

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.)



**Aronoff, M.** Darwinism tested by the science of language. In: Bower, C, Horn, L, Zanuttini, R, eds. *On Looking into Words (and beyond): Structures, Relations, Analyses*. Berlin: Language Science Press; 2017:443-456.

19th century linguists showed that languages from Europe to India were a single evolutionary family. Written records provided proof of evolution in the case of Latin and its descendant languages, which was not available to biologists. Darwin cited these successes: "A struggle for life is constantly going on amongst the words and grammatical forms in each language." Recently, the study of cultural evolution has revived the relation between language and evolutionary theory.



Barrett, BJ, McElreath, RL, **Perry, SE.** Pay-off-biased social learning underlies the diffusion of novel extractive foraging traditions in a wild primate. *Proc Biol Sci.* 2017;284(1856):20170358.

Social learning enables many primates to learn complex foraging behaviors. Instead of copying the majority, wild capuchin monkeys at Lomas Barbudal socially learn the most efficient way to access seeds in the hard *panamà* fruit via pay-off biased learning. This study uses novel statistical methods, allowing identification of learning strategies that rapidly spread adaptive innovations in the wild.

## CARTA-Inspired Publications

*Continued on the next page...*

Continued from the previous page...



Bergfeld, AK, et al., including **Gagneux, P, Varki, A.** N-glycolyl groups of nonhuman chondroitin sulfates survive in ancient fossils. *Proc Natl Acad Sci USA*. 2017;114(39):E8155–E8164.

Ancient DNA has not yet been found in African fossils. We discovered the first example of an ancient glycan—a type of sugar chain—in a 4 million-year-old animal fossil from Kenya. As a signature of a loss-of-function mutation in humans after our common ancestor with chimpanzees, ancient glycan analyses of hominin fossils may help determine which fossils represent direct ancestors.



**Churchland, PS.** The Brains Behind Morality [Internet]. *Cerebrum*. [http://www.dana.org/Cerebrum/2017/The\\_First\\_Neuroethics\\_Meeting\\_Then\\_and\\_Now/](http://www.dana.org/Cerebrum/2017/The_First_Neuroethics_Meeting_Then_and_Now/). Published October 31, 2017. Accessed May 18, 2018.

Knowing right from wrong is fundamental to human social life. Where does such knowledge come from? Age-old myths of divine origin have been gently eased aside as neuroscience reveals that our brains have a kind of moral positioning system(MPS). Its basic platform is our instinct to care. From birth, we quite naturally form strong bonds with others. During development we learn how to belong and behave in our community, and our MPS responds by coding for more specific norms and values.



**Davidson, I.** Images of Animals in Rock Art: Not Just “Good to Think.” In: David, B, McNiven, IJ, eds. *Oxford Handbook of the Archaeology and Anthropology of Rock Art*. Oxford: Oxford University Press; 2017.

This paper addresses theoretical and methodological issues in the study of animal images in rock and cave art, found in at least 100 countries. It discusses how animals species identifications and their pitfalls. It goes on to discuss how animals are represented with other animals and with humans; humans as animals and animals as humans; animals and their environments; and changes through time.



Donahue, CJ, Glasser, MF, **Preuss, TM, Rilling, JK,** Van Essen, DC. Quantitative assessment of prefrontal cortex in humans relative to nonhuman primates. *Proc Natl Acad Sci USA*. In Press: DOI: 10.1073/pnas.1721653115.

We addressed the controversial issue of prefrontal expansion in human evolution by using myeloarchitecture to identify prefrontal borders in humans, chimpanzees, and macaques. In absolute terms, human PFC gray matter is about 4.5 times as large as that of chimpanzees. Relative to brain size, human PFC gray matter occupies about 24% more of the cortical mantle than in chimpanzees.



Gregory, MD, et al., including **Berman, KF.** Neanderthal-Derived Genetic Variation Shapes Modern Human Cranium and Brain. *Sci Rep*. 2017;7(1):6308.

Before their disappearance from the fossil record, Neanderthals interbred with ancestors of present-day humans, leaving a gene-flow legacy that persists in modern human DNA. By searching for remnants of Neanderthal-derived DNA in living humans and combining this information with neuroimaging data, researchers have shed light on how this inheritance continues to affect our brains and skulls today.



**Humphrey, N.** Humans are the only animals who crave oblivion through suicide [Internet]. *aeon*. <https://aeon.co/ideas/humans-are-the-only-animals-who-crave-oblivion-through-suicide>.

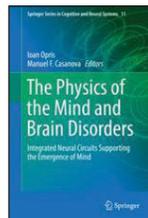
Published July 28,2017. Accessed May 18, 2018.

At some point in evolutionary history, human ancestors came to understand, as no animal does, that death brings to an end a person’s bodily and mental presence in the world. A potentially devastating consequence was that individuals, when experiencing physical or mental pain, might deliberately choose this outcome for themselves.



Humphrey, L, **Stringer, C.** *Our Human Story: Where we Come from and How we Evolved*. London: Natural History Museum; 2018.

*Our Human Story* is a beautifully illustrated guide to our fossil relatives, covering seven million years of human evolution. Drawing on the latest information, as well as their expertise and experience, the authors explain in clear and accessible terms what each of the key species represents, and how they contribute to our knowledge of human evolution.



**Kaas, JH.** What Makes the Human Brain Special: Key Features of Brain and Neocortex. In: Herculano-Houzel, S, Opris, I, Casanova, M, eds. *The Physics of the Mind and Brain Disorders. Springer Series in Cognitive and Neural Systems, vol 11*. Switzerland: Springer, Cham; 2017.

The human brain is different from other brains in ways that allow unique abilities. It is the largest primate brain. Our neocortex, the part devoted to cognition and perception, has more neurons than in mammals with even larger brains. It has more specialized parts, roughly 400 cortical areas, which are divided into smaller processing units, the cortical columns. These differences make us human.

Continued from the previous page...



**Meltzoff, AN, Ramírez, RR, Saby, JN, Larson, E, Taulu, S, Marshall, PJ.** Infant brain responses to felt and observed touch of hands and feet: an MEG study. *Dev Sci.* 2018;e12651.

The neurobiology of touch is understudied in human infancy. Using MEG brain imaging, 7-month-old infants had their own hand or foot touched or observed someone else's hand or foot being touched. Infants' hand and foot regions were activated when their own body was touched, and also when infants visually perceived touch to someone else's body. Cortical representations of body parts may underlie early connections between self and other and support infant social learning and imitation.



**Ortiz, A, Bailey, SE, Schwartz, GT, Hublin, JJ, Skinner, MM.** Evo-devo models of tooth development and the origin of hominoid molar diversity. *Sci Adv.* 2018;4:eaar2334.

Throughout ape and human evolution some lineages evolved complex molar teeth, while others evolved more simplified molars. Probing the development of molar form is key for determining the taxonomic, phylogenetic, and functional utility of these features. We found that a single developmental rule—the patterning cascade—explains the vast array of molar form over the last 15 million years of hominoid evolution.



**Palesch, D, et al., including Stewart, CB, Rogers, J.** Sooty mangabey genome sequence provides insight into AIDS resistance in a natural SIV host. *Nature.* 2018;553(7686):77–81.

Most African ape and monkey species harbor endemic SIV (simian immunodeficiency virus) strains, to which they appear largely adapted. A mystery about human evolution is why this is not true for our species, which is highly susceptible to HIV infection and disease. To understand adaptation to SIV in sooty mangabey, its genome was sequenced and analyzed for derived HIV-involved loci; this revealed that two key genes, *ICAM2* and *TLR4*, have major mutations.



**Piel, AK, Strampelli, P, Greathead, E, Hernandez-Aguilar, RA, Moore, J, Stewart, FA.** The diet of open-habitat chimpanzees (*Pan troglodytes schweinfurthii*) in the Issa valley, western Tanzania. *J Hum Evol.* 2017;112:57–69.

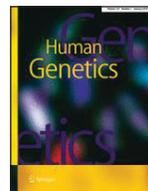
Knowledge of chimpanzee diet comes mainly from forest habitats. We describe the diet of chimpanzees living in a savanna woodland very like that inhabited by *Ardipithecus*. They concentrated on forest fruits, but increased reliance on savanna resources during

the dry season when fruit is less available in the forest (ranging more widely to do so). When fruit was scarce, they ate more tree bark.



**Rosenberg, KR, Trevathan, WR.** Evolutionary perspectives on cesarean section. *Evol Med Public Health.* 2018;2018(1):67–81.

The evolution of human bipedalism and encephalization led to essentially universal birth assistance and in some cases, interventions like cesarean section. Many surgical deliveries are elective, however, and risks to mothers and infants may outweigh negligible benefits. Social support at birth may reduce unnecessary cesareans, especially when women choose them because of fear of vaginal birth.



**Sikela, JM, Searles Quick, VB.** Genomic trade-offs: are autism and schizophrenia the steep price of the human brain. *Hum Genet.* 2018;137(1):1–13.

This paper explores the possibility that the same key genes that have been major contributors to the rapid evolutionary expansion of the human brain and its exceptional cognitive capacity also, in different combinations, are significant contributors to autism and schizophrenia. The Olduvai (formerly DUF1220) protein domain family is proposed as a primary contributor to this genomic trade-off.



**Solomon, S.** The Role of Death Denial in Culture and Consciousness. In: eds. *Emerging Trends in the Social and Behavioral Sciences.* Hoboken, NJ: John Wiley & Sons; 2017.

The awareness of personal mortality would undermine the viability of consciousness as an adaptive form mental organization in the absence of simultaneous death-denying cultural and psychological affectations. In accord with this view, empirical research demonstrates that intimations of mortality have a pervasive effect on a wide range of human beliefs and behaviors.



**Wrangham, RW.** Two types of aggression in human evolution. *Proc Natl Acad Sci USA.* 2018;115(2):245–253.

Proactive aggression is “cold” and goal-driven, whereas reactive aggression involves a “hot” response to a threat. Compared to chimpanzees and bonobos, humans have a high propensity for proactive aggression and a low propensity for reactive aggression. An evolutionary history of capital punishment can help explain the unusual human combination.

# CARTA Member Awards & Honors

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



**Alyssa Crittenden (University of Nevada, Las Vegas):**

2018 Barrick Scholar Award, UNLV; Elected President of the Society for Cross-Cultural Research.



**Haig Kazazian (Johns Hopkins School of Medicine):**

Elected into the National Academy of Sciences, 2018.



**Caleb Finch (University of Southern California):**

Doctorate *Honoris causis*, École Pratique des Hautes Études (EPHE).



**Christopher Kuzawa (Northwestern University):**

Elected into the National Academy of Sciences, 2018.



**Tony Hunter (Salk Institute):**

Pezcoller Foundation-AACR International Award for Cancer Research, 2018.



**Sarah Tishkoff (University of Pennsylvania):**

Elected into the National Academy of Sciences, 2017.

## CARTA Symposia Schedule

**Impact of Tool Use and Technology on the Evolution of the Human Mind**

October 12, 2018, Salk Institute

**CARTA 10th Anniversary: Revisiting the Agenda**

Winter 2019

**Anthropogeny: The Perspective from Africa**

Spring 2019

**Impact of Early Social Development on the Human Mind**

Fall 2019

## Find past CARTA symposia at



## Follow us on social media!



[facebook.com/ucsdcarta](https://facebook.com/ucsdcarta)



[twitter.com/cartaucsd](https://twitter.com/cartaucsd)

## 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>

## Support CARTA

Your donation helps to ensure that CARTA’s symposia remain free and available to all. There are three ways to donate to CARTA:

**ONLINE** Visit <https://carta.anthropogeny.org> and click “Support”

**BY MAIL** Make your check payable to the *UC San Diego Foundation* and include a brief note specifying your donation is to go to CARTA. Mail to:

CARTA  
UC San Diego Office of Annual Giving  
9500 Gilman Drive #0140  
La Jolla, CA 92093-0140

**BY PHONE** Call Ingrid Benirschke-Perkins, CARTA Community Relations Director, at (858) 246-0846