

Life's a Peach for Anthropologists in Atlanta

Atlanta, GA, was host to the annual meeting of the American Association of Physical Anthropologists (AAPA), which took place April 12–16, 2016. Presentations covered the latest work in modern human genetics, as well as exciting ancient DNA findings on hominin hybridization. Research explored early life influences in primate development and new insights regarding the hominin last common ancestor. Highlights also included the presentation of *Homo naledi* fossil material and perspectives on anthropogenic influences on primates.

HOMO NALEDI: A RISING STAR

The newly discovered hominin species *Homo naledi* played a starring role at this year's meeting. Many researchers announced preliminary analyses of the *H. naledi* material, efforts largely made possible by the open-access designs of Lee Berger (Witwatersrand).

The postcranial material of *H. naledi* exhibits a mosaic of primitive and human-like traits. Tracy Kivell (Kent) argued that the *H. naledi* hand exhibits a combination of *Homo*- and australopith-like features, including a powerful grasping thumb, radial carpal bones similar to those of modern humans and Neandertals, and ape-like curved phalanges, indicating climbing behaviors. Zach Throckmorton (Lincoln Memorial) discussed *H. naledi*'s gait, concluding that the mosaic of modern and nonmodern postcranial traits suggests obligate bipedality and orthogrady.

Lauren Schroeder (Buffalo) found that the cranial morphology of *H. naledi* is most similar to that of *Homo erectus*. This, in combination with tests of phenotypic diversity, led her to conclude that a combination of drift and small population sizes likely influenced the evolution of *H. naledi*. Lucas Delezene (Arkansas) examined metric and non-metric variation in the >190 teeth recovered from the Dinaledi chamber. The

teeth are strikingly uniform and small, with a suite of primitive and derived features supporting the designation of a new species. Matt Skinner (Kent), using microtomography scans to examine the enamel-dentine junction (EDJ) and enamel thickness in *H. naledi*, found that *H. naledi* hominins have a unique combination of EDJ traits.

PALEOANTHROPOLOGY: FINDING THE NEW IN THE VERY, VERY OLD

Martin Haeusler (Zurich) introduced a new virtual reconstruction of the MH2 pelvis (*Australopithecus sediba*), with fewer derived features than previously suggested. This indicates that derived pelvic morphologies did not necessarily precede larger-brained babies and modern forms of bipedalism in the hominin lineage. Mark Grabowski (AMNH) also studied hominin obstetric evolution, examining covariance within the pelvis using evolutionary quantitative genetic models. The results indicate that several pelvic changes in the birth canal were driven by selection for other traits, though human pelvic inlet and outlet dimensions changed independently and in different directions. Aida Gómez-Robles (George Washington) used comparative phylogenetic methods to demonstrate that hominin postcanine dental shape has evolved in a quasi-neutral model, making the trait well suited for phylogenetic inferences. The results also show that the rate of increase in brain expansion slowed after the emergence of premodern and modern *Homo*. Neil Roach (Harvard) examined fossil tracks preserved at Koobi Fora, including those of *Homo erectus*. The sediment and associated fauna indicate a lake margin paleoenvironment and suggest that perhaps *H. erectus* traveled in multimale social groups.

EXPLORING THE ANCESTRAL MORPHOTYPE OF HOMININS

Scott Williams (NYU) and Mark Grabowski (AMNH) organized a ses-

sion devoted to perspectives on the hominin last common ancestor (LCA). Nathan Thompson (Stony Brook) investigated the relationships among trunk motion, step width, and center of mass in chimpanzees and humans. The results suggested that preaustralopithecine bipedal hominins likely used wide step widths and pronounced thoracic angular motions. Yohannes Haile-Selassie (Cleveland Museum of Natural History) analyzed the Burtele foot, suggesting that its mosaic of human-like and ape-like morphologies provides evidence that several forms of bipedal adaptation existed during the Plio-Pleistocene. A mosaic LCA foot was also proposed by Jeremy DeSilva (Dartmouth), who argued that the LCA had a grasping hallux, a gracile calcaneus, and an elongated, mobile midfoot. Rui Diogo (Howard) reported that humans are unique in their loss of various head, neck, and upper limb muscles. He also urged caution when assigning functional explanations to "unique" structures, as his comparative dissections revealed "synapomorphic" muscles to not be synapomorphic at all.

BEYOND PRIMATES: FINCHES AND BEARS AS MODELS OF HYBRIDIZATION IN HUMAN EVOLUTION

In an invited symposium organized by Rebecca Ackermann (Cape Town) and Benedikt Hallgrímsson (Calgary), anthropologists were encouraged to look beyond primates to understand the dynamics of gene exchange across divergent lineages such as modern humans and Neanderthals. Notable biologists Peter and Rosemary Grant (Princeton) discussed hybridization in Darwin's finches as a model system for observing the process of hybridization when young species encounter each other after a period of separation and divergent evolution. Robert Wayne (UCLA) discussed hybridization in

wolves and domestic dogs, using the selective sweep of the black coat allele from domestic dogs into North American wolves as an example of how species admixture can both help and hinder the process of evolution in divergent lineages. James Cahill (UC Santa Cruz) presented the results of his work on introgression between brown bears and polar bears during the climate change that followed the last glacial maximum. These results broadly indicate that climate change is an important mediator of admixture.

ANCIENT DNA

Kay Prüfer (Max Planck) opened an invited symposium on ancient hybridization with a presentation highlighting how widespread gene flow was among Eurasian Pleistocene hominins, along with growing evidence of low levels of genetic diversity within Neanderthal and Denisovan populations. The probable consequences of such low diversity were made evident in the presentation of Sriram Sankararaman (Harvard) who found “deserts” of ancient ancestry, or genomic regions in which strong purifying selection prevented the propagation of ancient alleles, in modern human genomes. He proposed that ancient alleles in these regions were likely deleterious because low ancient effective population sizes precluded their effective removal. Alexis Sullivan (Pennsylvania State) examined Neanderthal genotypes at immune function genes. She found that these genes harbored a higher proportion of variants that are predicted to be deleterious than do modern human genes, providing potential evidence that susceptibility to pathogens contributed to Neanderthal extinction.

Several other presenters shared findings related to alleles at immune system genes. Aida Andrés (Max Planck) explained how she found evidence of the introgression of Neanderthal haplotypes at toll-like receptor genes, which alters the expression of these genes. Her functional assays demonstrated that the expression pattern driven by the Neanderthal haplotype results in decreased susceptibility to *Helicobacter pylori* infection and an increased allergic response. John Lindo (Chicago) scanned contemporary and ancient whole exomes for signatures of positive

selection in a First Nation population pre- and postcolonization known to have experienced a smallpox epidemic. Results showed significant changes in allele frequencies in genes related to immune function, specifically major histocompatibility complex genes, thus confirming the hypothesis that the epidemic resulted in immune gene adaptations.

GENETICS

Dan Eisenberg (Washington) looked at paternal age effects on offspring telomere lengths in 40 captive chimpanzees. He found that chimpanzees with older fathers had longer telomeres and that the effect was almost six times greater in chimpanzees than in humans. Because increased telomere length is thought to be correlated with life span, this suggests that high paternal age potentially confers a fitness advantage.

Ainash Childebayeva (Michigan) discussed epigenetic adaptations to chronic hypoxia and mining-related lead exposure in Andean human populations. Using a global methylation analysis of four CpG sites in 600 adults, she found that both the number of years living at high altitude and lead exposure were associated with altered methylation patterns. Mary Rogers (Illinois, Urbana-Champaign) investigated correlates of age at menarche in humans by examining methylation of the promoter region of *CYP19A1*; this gene codes for aromatase, an enzyme involved in estradiol biosynthesis. She found that age at menarche positively correlated with farming during childhood and *CYP19A1* promoter methylation, suggesting that energetic stressors affect age at menarche through epigenetic changes. Jessica Brinkworth (Illinois, Urbana-Champaign), having compared populations that had experienced differing levels of disease severity, discussed how modern human immunity has evolved in response to the plague (*Yersinia pestis*). Brinkworth examined the whole genome responses of macrophages when stimulated with *Y. pestis* via RNA sequencing, finding that in response to *Y. pestis*, European Americans, the population with pandemic-level plague outbreaks, upregulated more genes (including those involved in

inflammation). Results support divergence in immune response to the plague in peoples of African and European ancestry.

Eva Garrett (Calgary) conducted a comparative phylogenetic analysis of olfactory genes and social organization across a large number of mammals, including 55 primates. She found that the proportion of intact vomeronasal receptors (VRs) was negatively correlated with home range and group size, suggesting that the innate response to chemosensory stimuli mediated by the vomeronasal system may be more important in solitary animals compared to those living in large social groups. Christina Bergey (Notre Dame) presented the genomic differences between two closely related baboon taxa, *Papio anubis* and *Papio hamadryas*, which also show markedly different social organization and behavior. Bergey identified divergent regions of the two baboon genomes, some of which she found to overlap with genes involved in the dopamine pathway. This finding is concordant with previous findings that levels of dopamine metabolites in the cerebral spinal fluid differ between the two species and may mediate differences in male social and reproductive behavior. Lu Yao (Chicago) tested the island dwarfism hypothesis in *Macaca fascicularis* in the Philippines and Sunda Islands. Yao sequenced the mitochondrial genomes of 120 museum specimens, from which she also collected data on brain and body size. She found evidence of body size, but not brain size, dwarfing in the macaques, the signal of which was notably absent without phylogenetic correction, highlighting the importance of incorporating relatedness into comparative studies.

PRIMATES IN ANTHROPOGENIC ENVIRONMENTS

Several presentations highlighted the importance of considering anthropogenic influence when studying or conserving primate species. David Morgan (Lincoln Park Zoo) noted the group spread of nests constructed by gorillas and chimpanzees in Goualougo Triangle, Republic of Congo, along a conservation gradient ranging from pristine forest to zones within logging concessions. Gorillas were found to construct

nests within closer proximity to one another in areas of higher disturbance. Simplicious Gessa (Uganda Wildlife Authority) demonstrated the power of carefully framing instructions given to tourists before gorilla tracking in Bwindi Impenetrable National Park, Uganda. Negatively framed messages, such as those warning tourists of the risk of disease transfer and injury when rules are broken, proved the most effective method of maximizing tourist group cohesion and distance from gorillas. Erin Riley (San Diego State) examined the role of provisioning by boaters in the feeding ecology of Florida's Silver River rhesus macaques. While the majority of boats observed during the study period interacted with the macaques, only 12% were noted to provision them. Because the macaques use a wide variety of local natural foods in their diet, it is likely that provisions constitute only a fall-back food resource.

MATERNAL INVESTMENT AND EARLY LIFE INFLUENCES

Corinna Most (UC, San Diego) investigated maternal investment in two troops of olive baboons in ecologically diverse environments differing in the density of calorie-rich invasive species. Females in the site with the most calorie-rich food had faster-paced reproductive parameters. Most found that females there spent significantly less time carrying their infants. This broadly suggests that maternal investment is flexible within species and sensitive to changes in ecological conditions.

Iulia Badescu (Toronto) used fecal stable isotopes to determine average weaning age among chimpanzees at Ngogo, Uganda. Weaning occurred at four years, even though nipple contact was observed more than a year later. These results highlight the importance of using nonobservational methods to provide more nuanced information. Amy Lu (Stony Brook) explored offspring survivorship in wild geladas. Preweaned infants accounted for 91% of all deaths related to male takeovers and all infant deaths associated with loss of their mother, indicating the importance of early life events to infant survival.

Mallika Sarma (Notre Dame) tested whether early life experiences in human males predict hormonal changes later in life during life-history transitions and parenting behavior. Using data from an ongoing long-term study in Cebu, Philippines, she found that men who, during early life, experienced the death of a sibling were more likely to engage in a high degree of paternal care. However, results indicated a weak link between fathers' early life experiences and their parenting. This stands in contrast to the theoretical prediction that high extrinsic mortality should select for "faster" life histories. Toni Ziegler (Wisconsin) examined how interindividual variation in male parenting behavior in early life influences offspring survival and growth in the cooperatively breeding common marmoset. Infants of responsive fathers had a significantly higher survival rate and body weight, offering evidence that fathers who are highly interactive provide a fitness advantage to their offspring early in life.

NOVEL METHODOLOGIES IN PRIMATOLOGY

Many primatologists presented research employing exciting new tools to tackle important questions in socioecological research. Maryjka Blaszczyk (NYU) constructed social networks using grooming data to examine the temporal stability of sociability among vervet monkeys over time. She found that several social network metrics, including both in-degree and out-degree grooming behavior, were correlated across time, demonstrating that the use of social network analysis is a fruitful avenue for characterizing individual differences in personality traits. Marcy Ekanayake-Weber (Stony Brook) used agent-based modeling to test whether female kin reunite during opportunistic takeovers by males in hamadryas baboons. Using a combination of field and genetic data, as well as computer simulations, she found that relatedness within one-male units was higher than that between units, suggesting that kin-selected behaviors likely exist and that female behavior can affect group membership. Jeffrey Kerby (Dartmouth) presented a novel field-ready technology for use in accurately characterizing the morphological traits of wild primates in three dimensions.

This is a promising tool for a diverse array of field applications, including longitudinal studies of ontogeny and development. India Schneider-Crease (Duke) investigated the prevalence of a cyst-inducing tapeworm, *Taenia serialis*, in a wild gelada population to understand how host susceptibility to parasitic infections may act as a selective force affecting life span and reproductive success. Her results indicate that females are better than males at eliminating initial *T. serialis* infections, suggesting that the high demands of reproductive investment in male geladas may be accompanied by a fitness trade-off.

Outside of the academics, anthropologists rocked out to the music of fellow anthropologists! Dogstronauts, a band made up of George Washington University graduate students, performed an outstanding opener and really got the crowd going after a long day of presentations. They were followed by the main act, Demonic Males, who played an eclectic mix of covers, from The Beatles and Tom Petty to Cyndi Lauper and the Red Hot Chili Peppers, to the delight of an enthusiastic audience. <https://www.youtube.com/watch?v=11KSslnPh5s>.

Next year's AAPA meeting will be held in New Orleans, Louisiana April 18-22, 2017. Visit www.physanth.org for further details.

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