baby's skull had detached during decay. Removal of the woman's right hand from atop the pelvis, however, revealed the perinate's skull still within the pelvic cavity. Cranial development indicates an age of 7-8 fetal months. The position of the occipital squama against the pubes with chin tilted upward against the mother's left ilium indicates a breech delivery. Though representing up to 5% of births near term, evidence of breech birth in antiquity is rare. Other known cases and caveats in interpreting death due to pregnancy and childbirth are discussed. Fieldwork was conducted under licenses granted to Arizona State University by the US Department of Treasury, Office of Foreign Assets Control (Nos. SU-1897 & SU-2122). This research is based upon work supported by the Packard Humanities Institute (Award Nos. 07-1391, 07-1424, & 08-1472 [OFAC license No. SU-2071]) and The Regents of the University of California, and by the National Science Foundation (BCS-0647055).

Skeletal evidence for kneeling among prehispanic Zapotec women at the Mitla Fortress.

LINDSEY CADWELL BAKER[1], GARY FEINMAN[2] and LINDA NICHOLAS[2]. [1]Department of Anthropology, Southern Illinois University, [2]Department of Anthropology, The Field Museum.

In the eastern arm of the Valley of Oaxaca (Mexico) during the prehispanic era, xerophytic plants (such as maguey) had an important role in subsistence and craft production, namely fiber working. Recent archaeological excavations of domestic contexts at two Classic period sites in this region (El Palmillo, the Mitla Fortress) have yielded spindle whorls and bone tools that were associated with the manufacture of textiles. Modern Oaxacan women still utilize the backstrap loom for weaving cloth. This type of work commonly utilizes a habitual kneeling posture with hyperdorsiflexion of the toes, therefore individuals weaving in this manner should exhibit bony changes (e.g., kneeling facets) on the metatarsals and phalanges. Here we suggest that these kneeling facets are associated as much with the use of the backstrap loom as the grinding of maize, since both the Mitla Fortress and El Palmillo had little access to well-irrigated, flat terrain necessary for corn farming. During the 2009 field season at the Mitla Fortress, remains from nine probable adult males and four probable adult females were recovered; the subsequent analysis determined that all adult females show evidence of kneeling facets on one or more metatarsals, while none of the adult males exhibit this morphology. Furthermore, these kneeling facets are generally larger and more pronounced in older females. We interpret these data to support the existence of a sexual division of labor at the Mitla Fortress and the hypothesis that the observed morphology is likely associated with extensive use of the backstrap loom.

Asymmetry in facial musculature of rhesus macaques: Implications for evolution of laterality in facial expression.

MARK D. BALCENIUK[1], BRIDGET M. WALLER[2] and ANNE M. BURROWS[1,3]. [1]Department of Physical Therapy, Duquesne University, [2]Department of Psychology, University of Portsmouth, [3]Department of Anthropology, University of Pittsburgh.

Lateralization of brain function has been recognized in humans with the right side of the brain being dominant for producing and perceiving facial expressions associated with emotions, and the left side of the face perceived as being more emotive than the right side. Such laterality in emotions and facial expressions in humans seems to share evolutionary precursors in chimpanzees but data are equivocal for similar lateralization in phylogenetically more distant species such as macaques. Also, it is not know whether laterality of facial expression and emotion is reflected in the anatomy of the facial muscles themselves. The present study was designed to assess this component of lateralization of facial expression production in the rhesus macaque (*Macaca mulatta*). Preserved heads of six adult male rhesus macaques (*Macaca mulatta*) were used in this study. Facial expression musculature was exposed bilaterally and the zygomaticus major muscles of the face were chosen for measurement due to their use in several facial expressions in rhesus macaques. These muscles were photographed on both sides of the face and area of each muscle was measured using ImageJ. Areas from the left and right sides were compared and directional tendencies were noted with the left zygomaticus major muscle typically having greater area than the right. Therefore, lateralization of facial expression may not be limited to humans and other great apes, but may also be shared with macaques. These findings demonstrate the utility in studying facial expression throughout the primate order, and not as unique to humans.

Endocranial shape asymmetries in hominids, including fossil hominins and extant hominids, assessed via skull based landmark analysis of 3D reconstructions from CT images.

ANTOINE BALZEAU[1,2], EMMANUEL GILISSEN[2,3] and DOMINIQUE GRIMAUD-HERVÉ[1]. [1]CNRS, UMR 7194, Département de Préhistoire du Muséum national d'histoire naturelle, Paris, [2]Department of African Zoology, Royal Museum for Central Africa, Tervuren, Belgium, [3]Université Libre de Bruxelles, Laboratory of Histology and Neuropathology, Brussels.

Asymmetries in brain shape, commonly known as petalias, consist in the extension of one cerebral hemisphere beyond the other and can be defined by two structural components: a larger lateral extent of one hemisphere relative to the other usually coupled with a larger frontal or caudal projection of one hemisphere relative to the other. A major issue in quantifying these petalias in endocasts is the definition of the endocranial surface midline because studies of human brain material show that most of the mesial surface of the left occipital lobe distorts the midline and protrudes into the right side, making the midline identification and the corresponding left and right reference points' definition problematic. We therefore illustrate a new protocol based on unbiased skull landmarks definition in order to accurately quantify and compare brain shape asymmetries. This protocol is performed on 3D reconstructions from CT images. Our current sample is represented by >30 fossil hominins, 45 extant anatomically modern humans and 110 specimens of each sex of extant African great apes. We describe and quantify the positions in 3D of frontal and occipital projections in this large sample. This analysis complements our previous results and allows the grouping of fossil hominins and extant hominid species based on the degree of asymmetry of these projections. The pattern and extent of asymmetry of these petalial components in great apes and in fossil hominins show considerable variations. Phylogenetic and possible functional implications of the observed inter-specific variation are discussed. This study was funded by the European Commission, contract number 029023.

Interior versus exterior edges: Their effect on home range, spatial ecology and feeding ecology of Milne-Edwards' Sifakas (*Propithecus edwardsi*) in Ranomafana National Park, Madagascar.

KATHERINE H. BANNAR-MARTIN[1] and SHAWN M. LEHMAN[2] [1]Department of Anthropology, University of Texas at Austin, [2]Department of Anthropology, University of Toronto.

Forest edges are becoming a more abundant habitat feature as forest fragmentation and anthropogenic disturbance increases worldwide. Edge effects, measured as changes in vegetation structure and plant species richness from the edge into the forest core, pose potential constraints on primate ranging, dispersal and behaviour. Primates can mediate edge effects by adjusting their ranging behaviour with respect to both edge proximity and edge type. The effects of edge proximity and type on the ranging behaviour and feeding ecology of *Propithecus edwardsi* in Ranomafana National Park were investigated. Two edge types were distinguished: internal edges, located within continuous forest areas, and external edges, located on forest boundaries. Behavioural and location data were collected May to September 2008, and used with GIS to determine lemur distribution with respect to edge proximity and type. The highest proportion of range use and feeding events occurred within 250m of the edge: a positive edge response. The strength of the edge response differed between the two sites, with a stronger response in the external edge site. *P. edwardsi* in the external edge site also had a smaller home range, larger core range, and higher density. *P. edwardsi* show a positive edge response, however the strength of edge response appears to vary with edge type. Edges are complicated habitat features that reflect microhabitats with multidimensional characteristics (e.g. intensity, depth, height, location, age, etc). They can have long-term impacts on primate behaviour, and consequently

their role in primate ecology is fundamental to the conservation of primate populations.

Petrous bone orientation, foramen magnum position, and the evolution of early hominids.

ALON BARASH, ELLA BEEN, and YOEL RAK. Department of Anatomy & Anthropology, Sackler School of Medicine, Tel Aviv University.

The posterior cranial fossa is one of the main structures within the cranial base that have gone through extensive modification during human evolution. Many authors suggest that these adaptations are either the product of our large brain or bipedal locomotion. Early hominids basicranium may represent either the changing morphology along the ape-human morphocline, or exhibit an in part autapomorphic feature unique to them. Here we present data from the internal part of the posterior cranial fossa, to support the second hypothesis.
We measured the angle of the superior petrosal sinus to the midsagittal, the position of the foramen magnum to the bi-poria line and three foramina within the basicranium. Our results indicate that while in humans and australopithecines the carotid canal has migrated to a more lateral position, the internal acoustic meatus and foramen ovale remained around the same position as in the primitive ape state. However, the orientation of the inner part of the petrous is the about the same in apes and humans at around 50 degrees, while in early hominids the petrous is orientated more sagittaly at around 40 degrees. This may be coupled with the known fact that the foramen magnum orientation to the bi-poria line in early hominids is actually more anterior projecting than in humans.
Our results indicate a distinct basicranial morphology of australopithecines that sets them apart from both modern humans and apes. The cause for this morphology is unclear and could be due to the biomechanical constrains of early hominids.

Plantar pressure during bipedalism and quadrupedalism in *Cebus*.

MARIN B.BARDEN[1], ROSHNA E. WUNDERLICH[1] and BRIGITTE DEMES[2]. [1]Department of Biology, James Madison University, [2] Department of Anatomical Sciences, Stony Brook University.

Cebus predominantly walk quadrupedally but use bipedalism to carry objects such as *syagrus* nuts or stones. Little research has examined foot biomechanics in nonhominoid primates who use bipedalism. Identifying similarities and differences among distantly related primates utilizing bipedalism will further our understanding of the fundamental biomechanical requirements of bipedalism and the evolution of human bipedalism and the modern human foot.
We compared plantar pressure distribution in two captive *Cebus apella* walking across a pressure mat quadrupedally and bipedally. Center of pressure trajectory, relative peak plantar pressures, and timing of pressure in the midfoot and forefoot were compared during bipedal and quadrupedal walking. Simultaneous video data were used to assess speed.
Pressures are slightly higher during bipedalism than quadrupedalism in all regions of the foot. Peak pressures during bipedalism and quadrupedalism are higher on the lateral midfoot and metatarsals than the medial side, unlike the pattern in apes and modern humans who load the medial side of the foot early in stance. Contact time, however, in the medial forefoot is longer during bipedalism. During bipedalism, both contact area and contact time are higher in all regions except the first metatarsal, a region heavily loaded during toe-off in humans. Peak pressures in the forefoot are not significantly different during quadrupedalism and bipedalism, suggesting a similar propulsive function in both cases. These data show that *Cebus* increase load only slightly when shifting to bipedalism, and their foot functions similarly across gaits and does not show a pattern like that of the human foot.
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A comparative stereological analysis of neuron numbers in the human and non-human primate basolateral amygdala.

NICOLE BARGER[1], CYNTHIA M. SCHUMANN[2], JACOPO ANNESE[3], CHET C. SHERWOOD[4], LISA STEFANACCI[5], PATRICK HOF[6], and KATERINA SEMENDEFERI[1]. [1]Dept. of Anthropology, University of California, San Diego, [2]M.I.N.D Institute, University of California, Davis, [3] Dept. of Radiology, University of California, San Diego, [4] Dept. of Anthropology, George Washington University, [5]The Salk Institute For Biological Sciences, [6]Dept. of Neuroscience, Mt. Sinai School of Medicine.

Though little comparative neuroanatomical data exist for structures comprising the "social brain", volumetric analyses suggest that one such structure, the amygdala, evidences internal reorganization in hominoids, specifically in its basolateral division, comprised of the lateral, basal, and accessory basal amygdaloid nuclei. Compared with other hominoids, humans possess a uniquely enlarged lateral nucleus. In contrast, the semi-solitary orangutan exhibits reduced basolateral volumes, due predominantly to decreases in accessory basal and basal nuclei. To further investigate these trends in amygdala reorganization, we counted neuron numbers for the basolateral division and basolateral nuclei using unbiased stereological methods (optical fractionator) on hand-traced, Nissl-stained histological sections. We sampled humans, all ape species, and long-tailed macaques using three to twelve individuals per species. Neurons in the human lateral and basal nucleus, respectively, were proportionately more ($p<0.001$) and less ($p<0.001$) numerous than in African apes. Contrasted with other apes, the orangutan basolateral division ($p<0.01$), basal ($p<0.01$), and accessory basal nuclei ($p<0.01$) contained proportionately fewer neurons. In macaques as in humans, neurons were most abundant in the lateral nucleus. Nonetheless, this similarity is likely due to a comparatively smaller representation of neurons in the macaque basal nucleus ($p<0.05$) and not a larger proportion in the lateral ($p>>0.05$). Given that neuronal and volumetric data agree, amygdala reorganization likely reflects evolutionary increases in specific neuronal populations rather than simply developmental increases in white matter, *e.g.*, ancillary fibers of passage, further supporting the idea that coordinated changes between individual amygdaloid nuclei and highly connected cortical areas are of evolutionary origin. This study was funded by the NSF, Doctoral Dissertation Improvement Grant (#0726240), and The Wenner Gren Foundation.

Masticatory mechanics and the production of dental microwear.

CLAIRE BARRETT and PATRICK MAHONEY. Department of Anthropology, University of Kent.

This study explores differences in microwear orientation and length between molars in a sample of primates. It has long been known that the orientation of microwear striations indicate jaw movements during mastication. The size of microwear features also seems to reflect jaw size in humans. Therefore, if clear correlations could be established between microwear and masticatory mechanics these could be extrapolated to fossil hominin studies and add vital information about likely evolutionary grade placement for specimens known only by incomplete or purely dental remains.
Dental impressions of first, second and third mandibular molars from *Pan troglodytes (n=11) Gorilla gorilla (n=5)* and *Papio Anubis (n=8)* were obtained. Resin casts were produced, and digital micrographs were taken of facet 9, using a scanning electron microscope. Micrographs were analysed using Microwear 4.02.
Results for second molars indicated differences in mean length of striations between the species. The mean striation length was 50.52µm for *Pan*, 64.63µm for *Gorilla* and 45.25µm for *Papio*. Striation orientation was found to be consistent within species, but varied between 118.55 degrees in *Pan* to 89.97 degrees in *Papio*.
These findings indicate some differences between the species, which may relate to transverse movement experienced by different molars as well as bite force. Ongoing study with a larger sample size will examine microwear correlations with morphometric measurements across a range of primates. Findings should provide information as to whether microwear techniques can be applied in the analysis of fossil hominin taxa.

Encephalization and reproduction in lemurs: Higher metabolic rates in mothers and infants of larger-brain species reflect the cost of brain growth.

NANCY L. BARRICKMAN[1]and MAGGIE LIN[2]. [1]Department of Anthropology, University of Waterloo, [2]School of Medicine, University of Maryland.

The high cost of brain maintenance in adult primates is strongly suggested by studies that