pared to their body mass, while all other perivertebral muscles have the ACSAs as predicted by body mass. This smaller lateral tract points to a decreased need for mobilization, likely correlated with the comparatively short, stiff trunk of non-human apes.
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Direction and intensity of sexual dimorphism in European and Chinese mandibles' outer contour.

STEFAN SCHLAGER[1] and MARC METZGER[2]. [1]Department of Anthropology, University of Freiburg, [2]Department of Oral and Maxillofacial Surgery, University Clinics Freiburg.

Analysing sexual dimorphism is a crucial task in palaeoanthropological, forensic and ecological studies of human remains. The mandible as a very prominent feature in a person's physique is known to be a sexual marker. Our goal was to show if there are common linear combinations of shape vectors explaining the differences between the sexes and to compare the amount of sexual dimorphism between different populations.
We used CT-Scans of 925 European and 960 Chinese individuals. Only pathologically unaffected mandibles were included.
The data consists of 18 anatomical and mathematically constructed landmarks along the mandible's outer contour.
We used geometric morphometrics to extract shape data and remove information about orientation, location and size. The resulting data was analysed applying several multivariate statistical methods, including parametric testing and permutation tests.
Sexual dimorphism in shape as well as in size was significant within both populations: discriminant analysis on shape data shows a distinct separation between the sexes. To test differences in direction and intensity of sexual dimorphism between populations, vector angles and lengths were compared and tested using permutation testing. The results implicate that there is no common shape trajectory dividing males from females within both populations. This means that shape changes associated with sexual dimorphism are highly population dependent. Also, the lengths of those shape vectors dividing the sexes differ significantly, indicating differences in the intensity of the expression of gender specific patterns between populations – at least as far as the landmark configuration in question is concerned.

Dental microwear texture analysis of Natufian hunter-gatherers and Neolithic farmers from Northern Israel.

CHRISTOPHER SCHMIDT[1], LAURA CHIU[1], LINDSY FRAZER[1], CLAIRE BARRETT[2] and PATRICK MAHONEY[2]. [1]Department of Anthropology, University of Indianapolis, [2]School of Anthropology and Conservation, University of Kent.

Dental microwear texture analysis (DTA) reconstructs dietary hardness and toughness using a white light confocal profiler to generate 3D surface representations and data clouds that are processed with scale sensitive fractal analysis software. Here, we employ DTA to search for dietary differences between sixteen Natufian hunter-gatherers (12,500–10,250 BP) and fifteen late Neolithic farmers (10,250–7,500 BP), recovered from archaeological sites in northern Israel.
Resin casts of molar occlusal facets 9 and 10 were produced. Data were collected using a 100X objective lens and the extended topography option, which allowed for four contiguous data sets to be taken and stitched together automatically by the microscope. The resulting surface representations were leveled and occlusal debris was digitally removed prior to analysis. Toothfrax® and Sfrax® software were used to calculate anisotropy (the degree to which microwear features are similarly oriented), heterogeneity (the extent to which microwear features are the same over the area of interest), complexity (the surface relief), and the textural fill volume (the amount of surface removed by microwear). Data were log transformed and variation between the hunter-gatherers and farmers was identified using ANOVA.
No differences were found between facets 9 and 10. One variable, anisotropy, differed significiantly between Natufian and Neolithic groups ($df=1$, $F=5.954$, $p=0.024$), indicating that the microwear was more similarly oriented within the Neolithic. This finding supports the idea that food processing changed over time as agriculture emerged in northern Israel (e.g., Mahoney, 2006).
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Is there biomechanical equivalence when comparing mobility, activity levels, and limb loading across individuals and species?

DANIEL SCHMITT[1] and MARK W. HAMRICK[2]. [1]Department of Evolutionary Anthropology, Duke University, [2]Department of Cellular Biology and Anatomy, Medical College of Georgia.

Discussions of mobility and functional anatomy often assume that higher activity levels increase bone loading in all animals in all contexts. But it is worth asking whether two animals moving at the same speed and distance produce the same loading pattern and whether increased bone mechanical properties reflect increased activity levels? Here we examine data from a variety of our comparative laboratory-based studies on limb loading. Our findings reveal that the relationship between activity and loading is more complex than previously assumed. For example, data collected on primates compared at the same speed on arboreal and terrestrial supports show changes in contact time and center of mass (COM) movements that influence load. Cats moving at equivalent speeds to dogs must generate more muscular effort to move the COM and may load their bones more. Data on primates moving at the same speed also show that gait choices (i.e. walk compared to amble) influences peak forces and COM movements. Finally, data on hyper-muscular mice with high levels of bone robusticity indicate that these animals choose slower speeds are no more active than wild-type mice, rejecting a relatively straightforward relationship between activity, load, and bone strength. Taken together these observations suggest that the same mobility or activity level can yield different loading levels depending on substrate context, gait choice, and species. Given these caveats, definitions of mobility must be precise as to gait, substrate, anatomy, and posture, and must accommodate the notion that bone mechanical properties are not necessarily reflective of activity.
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Differences in endocranial shape between *Homo* and *Pongids* assessed through non-rigid deformation analysis of high-resolution CT images.

P. THOMAS SCHOENEMANN[1], RALPH HOLLOWAY[2], JANET MONGE[3], BRIAN AVANTS[4] and JAMES GEE[4]. [1]Department of Anthropology, Indiana University, [2]Department of Anthropology, Columbia University, [3]Department of Anthropology, University of Pennsylvania, [4]Department of Radiology, University of Pennsylvania.

Our understanding of evolutionary changes in brain anatomy, as evident in fossil specimens, is facilitated by a statistical assessment of species differences in endocranial morphology. Because the endocranial surface is morphologically complex, such comparative assessments will ideally involve rich mathematical descriptions that can be directly and easily compared between species and to fossils. Atlases representing statistical averages of species endocranial form

have been created using non-rigid deformation techniques applied to endocranial casts collected by Ralph Holloway. Point-by-point voxel-based assessments of species differences have then been constructed by morphing species' atlases into each other. This method results in detailed statistical maps of exactly where species differ endocranially, and by how much. We present the results of these methods applied to differences between *Homo sapiens*, *Pan troglodytes*, *Pan paniscus*, and *Gorilla gorilla* endocranial atlases. The analysis for *Homo* and *Pan troglodytes* suggests that the orbitofrontal surface and posterior occipital areas are the most different between these species, suggesting more than 4-fold increases in these areas, while portions of the temporal poles suggest less than 2.5-fold differences (overall, the endocranial surfaces averaged 3.1-fold differences). These findings will be compared with similar published assessments of differences between the brains of these species. Methods for making point-by-point assessments of differences between fossil specimens and extant species atlases, as well as between fossil specimens themselves, will be described. These will allow for a detailed assessment of the evolution of brain evolution as inferred from the endocranial surface.

Mandibular premolar molarization: a platyrrhine comparative model.

KATHERINE SCHROER[1,2] and BERNARD WOOD[2,3]. [1]Hominid Paleobiology Doctoral Program, [2]Center for the Advanced Study of Hominid Paleobiology, Department of Anthropology, The George Washington University, [3]Human Origins Program, National Museum of Natural History, Smithsonian Institution.

Molarization of the crown of the last mandibular premolar is a distinctive feature of some extinct early *Homo* and megadont archaic hominin taxa, but there is debate about whether molarization is a shared derived character or a homoplasy. New World monkeys provide a suitable morphological and developmental sample for understanding molarization in primates. We sampled mandibular postcanine crown and root morphology and obtained proxies for body size from *c*.150 callitrichid and other platyrrhine individuals from the collections of the National Museum of Natural History, Smithsonian Institution. The sample included closely-related sympatric species with known dietary niches, including individuals of *Saguinus fuscicollis*, *Saguinus labiatus*, and *Callimico goeldii*. Mandibular molar and premolar crown morphology was compared using linear and areal measurements based on enlarged occlusal photographs, and mandibular molar and premolar root morphology was compared using linear and areal measurements taken from plain radiographs. Preliminary results indicate that P_4 linear and areal measurements vary independently of body size and crown area correlates more closely with root profile area in molars than in premolars. Principal components analysis of occlusal morphology suggests that sympatric species vary significantly in their mandibular premolar crown morphology. We suggest various ways in which the results of this study of premolar morphology in closely-related and sympatric New World primate species can be used to develop hypotheses about the phylogenetic significance of the mandibular premolar morphology of megadont archaic hominins.
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The positional behavior of ursine colobus (*Colobus vellerosus*) and Lowe's monkey (*Cercopithecus campbelli lowei*) in Ghana's Boabeng-Fiema Monkey Sanctuary.

ROB SCHUBERT and SCOTT MCGRAW. Department of Anthropology, The Ohio State University.

The extent to which primates vary their positional behavior in response to architecturally distinct forests continues to be a topic of active research. Here, we compare the locomotor and postural profiles of two cercopithecoid species ranging across a mosaic of forest habitats in Ghana's Boabeng-Fiema Monkey Sanctuary (BFMS). From January to October 2009, we used instantaneous time point sampling to collect positional and habitat data on multiple groups of adult female ursine colobus (*Colobus vellerosus*) and Lowe's monkey (*Cercopithecus campbelli lowei*) inhabiting either areas of unlogged, primary forest or regenerating forest. Architectural differences between forests were quantified using focal canopy density sampling methods. Significant intraspecific differences in positional behavior and habitat use profiles were identified using G-tests and Fisher Exact Tests. For the ursine colobus, postural profiles differed between forest habitats. For Lowe's monkey, both locomotor and postural profiles differed. Both species tended to frequent low forest levels more often in disturbed forest where the paucity of upper canopy pathways required that individuals use thinner supports at lower heights. We suggest that the large body size and leaping adaptations of the ursine colobus constrain its locomotion compared to that of the smaller, more generalized guenon. Nevertheless, those positional behavior differences that were observed were subtle and provide support for the notion that basic positional behavior profiles tend to be conserved across habitats.
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Bioarchaeology and climate change: a view from South Asian prehistory.

GWEN ROBBINS SCHUG. Department of Anthropology, Appalachian State University.

Throughout the second millennium B.C., human populations thrived in west-central India. Deccan Chalcolithic people settled in villages employing a mixed economic strategy—farming drought-resistant barley, stockraising, hunting and foraging. After 1000 B.C., the majority of these settlements were abandoned. Only Inamgaon persisted into the Late Jorwe phase (1000-700 B.C.). Archaeologists suggested that increasing aridity and unpredictable monsoon rainfall caused the depopulation. Bioarchaeologists suggested the Late Jorwe was a time of increased dietary diversity, population mobility, lower biocultural stress levels and improvements in infant health. However, recent paleoclimate reconstructions indicate the unpredictable monsoon and reduced rainfall were well established long before these settlements were abandoned and are not likely to be directly responsible. This poster presents a new interpretation of life and death at three villages occupied during the Deccan Chalcolithic period of Indian prehistory based on new evidence from paleoecology, demography, and bioarchaeology. Paleodemography indicates high fertility and infant mortality led to high pressure population dynamics during the Late Jorwe phase at Inamgaon. The osteological paradox thus plays an important role in the interpretation of biocultural stress markers. When previous data for dental stress markers is combined with evidence of subadult skeletal emaciation, it is apparent that acute and chronic stress markers tell different stories about life at the end of agriculture in prehistoric India. These results are the basis for a new Biodemographic Model for understanding climate and culture change during this period of climate and culture change in Indian prehistory.

Genetic histories of Gwich'in and Inuvialuit populations of Northwest Territories, Canada.

THEODORE G. SCHURR[1], AMANDA C. OWINGS[1], JILL B. GAIESKI[1], INGRID KRITSCH[2], ALESTINE ANDRE[2], CRYSTAL LENNIE[3], HALEIGH ZILLGES[1], KEVIN KEATING[1] and GENOGRAPHIC CONSORTIUM. [1]Department of Anthropology, University of Pennsylvania, [2]Gwich'in Social and Cultural Institute, [3]Inuvialiut Regional Corporation.

In this study, we investigate the genetic history of Dene and Inuvialuit populations from the Northwest Territories to help elucidate the history of circumarc-