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2000 BP marks a significant event in South African prehistory: the arrival of herding into areas previously occupied exclusively by foragers. The foraging lifestyle was not completely replaced by herding, but rather continued to exist alongside herding for many centuries. Archaeological, linguistic, genetic, and ethnographic evidence have informed the debate over the mechanisms responsible for the introduction of herding: a migration of people or a diffusion of ideas. Skeletal differences relating to body mass, asymmetry and robusticity, and positional behaviour have been identified in Later Stone Age (LSA) populations inhabiting various parts of the Cape region, but the relationship between foragers and herders has not received much study. In the Eastern Cape, the presence of variation in burial patterns confirms the presence of some herder occupations. This research explores the mechanisms surrounding the arrival of sheep herding in southernmost South Africa from a skeletal perspective. In an attempt to quantify the potential similarities or differences in the skeleton as a whole, craniometric, osteometric, and odontometric data was collected on a sample of 72 radiometrically dated LSA adult skeletons from the Eastern Cape region of South Africa, dating between 8000 BP and 300BP. The results do not provide any solid indication as to the mechanism responsible for the arrival of herding, but do suggest an increase in skeletal variability began to occur just prior to 2000 BP, increasing in magnitude after 2000 BP. The inclusion of additional skeletal information may help to better understand the factors responsible for this transition.

The history of hominin occupation in Central Asia in review.

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The timing and pattern of hominin colonization of Asia is poorly understood. Although site distribution provides a general schema of hominin locations, the lack of a well controlled and regionally integrated chronological framework prevents clear resolution of the timing and trajectory of hominin migrations and subsequent colonization of specific regions of Asia. This problem further obscures the ability to understand hominin population dynamics in Asia as well. The purpose of the present study is to examine the degree to which an autochthonous evolutionary trajectory initiated during the terminal phases of the early Pleistocene and extending to the early Upper Paleolithic is supported in Central Asia. Archaeological and human paleontological evidence from the region is reviewed and its character compared to that of the neighboring regions of the Near East, the Altai and China. This review informs a more detailed analysis of the Central Asian Middle Paleolithic record. Prevailing theoretical models suggest that Central Asia was inhabited by Neandertals migrating from the west to seek refuge from expanding modern human populations during the Middle Paleolithic. Morphological analyses of the newly discovered Obi-Rakhmat hominin and a re-evaluation of the Teshik-Tash child, both sites from Uzbekistan, provide a test of this model. Results indicate that the morphological pattern that typically describes European Neandertals is absent in Central Asia. Although both Obi-Rakhmat and Teshik-Tash express some Neandertal features, their morphologies also suggest some admixture with local populations and/or those migrating into Central Asia from the North and East.

Trauma risk in the neolithic community at Çatalhöyük, Turkey.

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The Neolithic represents a period of considerable transition in which economies, and social life changed on both local and regional scales. The effect that these physical and social changes may have had on the prevalence and risk of injury is a matter of long standing debate. We suggest an analytical framework for the investigation of skeletal injury in limited and often fragmentary human remains while also introducing some preliminary evidence on the healed infra-cranial fractures identified in the Neolithic skeletal sample from Çatalhöyük, Turkey. The Çatalhöyük skeletal sample is currently comprised of over 200 human skeletons recovered between 1995 and 2006. The site and its associated skeletal sample are important sources of data on early Anatolian agricultural settlements and the people that inhabited them.
Preliminary risk assessment results based on fracture prevalence data and probability models indicate an average of 1.2 bone fractures per individual at Çatalhöyük with an estimated 36% chance of sustaining a least one bone fracture and a 30% chance of never experiencing a fracture. Fractures as events are randomly distributed amongst individuals of the sample. The gross long bone fracture rate is 33.6 per 1000 individuals and when broken down further 24.4 per 1000 females (n = 41 complete long bones) and 15.2 per 1000 males (n = 66). The odds of long bone fracture among Çatalhöyük females are slightly greater than among males but the association is only moderately weak. We conclude that risk of infra-cranial skeletal injury at Çatalhöyük appears to be relatively low and homogenous in the population.
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4-dimensional diffeomorphic modeling: A novel approach for investigating human embryonic brain development.

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Detailed knowledge of human embryonic brain development is of fundamental importance to a wide range of questions from the underlying causes of normal and abnormal neuroanatomical variation to how developmental processes mediate the transformation of brains in evolution. However, the embryonic development of the brain involves complex sequences of tissue growth and movements (morphogenesis) occurring in 4-dimensions (4D) (i.e., in 3-dimensional (3D) space and in time) that have been impossible to analyze rigorously with traditional 2-dimensional (2D) histology-based methods (O'Rahilly and Müler 1999; Yamada et al. 2006).
To overcome these limitations, this project develops a novel methodological approach that synthesizes several cutting-edge computational techniques: (1) digital microscopy; (2) 3D digital reconstruction and de-warping; and (3) 3D diffeomorphic image registration (DIR) with 4D graphical interpolation. An empirically-based pilot model is presented using 5 whole, serially sectioned brains of different stages of development from the Carnegie Collection of Embryology. 2D sections for each brain were digitized, reconstructed in 3D, and de-warped. 3D specimens from one stage of development to the next were registered, sequentially, with DIR (e.g., stage i → stage i +1 →… stage i + n). The model provides unparalleled cellular/tissue contrast, 3D and 4D structural quantifiability, and the ability to graphically interpolate the 4D morphogenetic continuity that links successive stages of brain development. This model also provides a novel framework for non-invasive testing of evolutionary-developmental hypotheses, cross-species development comparisons, integration of 3D gene expression models, and exploration of theoretical morphospace via user-defined manipulation of morphogenetic variables.

Handedness and Directional Asymmetry of Lower Limbs: Testing the Hypothesis of the Crosse Symmetry Pattern in Articular Dimensions

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Directional bilateral asymmetry in human gross skeletal morphology is largely attributable to differential mechanical loading during growth. While much has been done in the way of identifying directional asymmetry in the diaphysis of the upper limb, comparatively little research has