



PASC SCPA Inaugural meeting 2015

Winnipeg, MB

Held in conjunctions with CAPA/ACAP conference

October 29-30th

Thursday 29th Oct

Paleoanthropology

2:00:00 PM - 2:15:00 PM Hopwood DE

Escalation as a Motive Force in the Behavioural Evolution of Early Homo and Homo erectus

2:15:00 PM - 2:30:00 PM * Klassen P

Finding our roots: premolar root morphology evolution within the Plio-Pleistocene hominin clade

2:30:00 PM - 2:45:00 PM Abbas RS Skinner MM

A Geometric Morphometric Analysis of the Molars of the Piltdown Specimen

2:45:00 PM - 3:00:00 PM Silcox MT, Dunn RH, Kumar K, Rana R, Sahni A, Smith T, Rose KD

What can you do with an ear bone? Phylogenetic and functional inferences from an exceptionally well-preserved Early Eocene primate petrosal (Cambay Shale Formation, India)

Friday 30th Oct

Symposium: Paleoanthropology and Migration

8:30:00 AM - 8:45:00 AM Cote S

High levels of endemism in East African early Miocene catarrhines: does limited migration play a role?

8:45:00 AM - 9:00:00 AM Werner JJ

Hafted hunting weapons and the dispersal of early modern humans: use-wear evidence from the Magubike archaeological site, Tanzania.

9:00:00 AM - 9:15:00 AM Hopper C, Sealy J, and Dewar G

Tracking migration in South Africa using serial sampling of dentine for stable isotope analysis

9:15:00 AM - 9:30:00 AM Willoughby PR

Population expansion and contraction: The role of East Africa before and during Out of Africa 2

9:30:00 AM - 9:45:00 AM Roksandic M

The role of the Balkans in early human migrations to Europe

9:45:00 AM - 10:00:00 AM Begun D

Ample time for migration on the largest scale

ABSTRACTS:

1. A geometric morphometric analysis of the molars of the Piltdown specimen

Abbas, R.S.¹ and M.M. Skinner^{2,3}

¹Institute of Archaeology, University College London; ²School of Anthropology and Conservation, University of Kent; ³Max-Planck-Institute for Evolutionary Anthropology

Molar crown morphology has been used for alpha taxonomy and has successfully addressed taxonomic questions in extant apes. In this study, quantitative and qualitative analyses compared molar crown morphology in order to examine the taxonomic affiliation of the Piltdown molars. The quantitative analysis involved the geometric morphometric (GM) analysis of the enamel dentine junction (EDJ) shape variation amongst groups of *Homo*, *Gorilla*, *Pan* and *Pongo* in an attempt to identify affinities with the Piltdown molars. A metameric analysis was also conducted exploring variation amongst the Piltdown molars in order to identify the molar position of the Piltdown 2 tooth. Micro CT scans of the mandible were analyzed in order to identify the correlation between the Piltdown 1 molars and the mandible. Results suggest the Piltdown 1 molars and mandible most likely belong to the same orangutan individual as that of Piltdown 2 which in turn is a lower first molar. Additionally, comparisons between GM analyses using different landmark sets involved in this study concluded the possibility to conduct reliable EDJ morphological assessments with-or-for samples consisting of incomplete or worn surfaces. These results confirm previous findings that the EDJ preserves taxonomically significant shape information in worn teeth and that mean differences in EDJ shape consist of differences in horn height and EDJ and CEJ ridge shape.

2. Ample time for migration on the largest scale

Begun, D.R.

Department of Anthropology, University of Toronto

In 1871 Charles Darwin recognized the scope and magnitude of faunal migrations, something many researchers of prehistory and paleontology have forgotten. While Darwin thought it somewhat more likely that African apes and humans first evolved in Africa, given the evidence of *Dryopithecus* from France, he noted that there was “ample time for migration on the largest scale” to explain the presence of a hominine, that is, an African ape/human ancestor, in Europe. This observation has been largely ignored in favor, despite the absence of evidence, of the hypothesis of an in situ Africa evolution of the hominines. Between about 12.5 and 6 Ma in both Europe and Asia there is evidence of the hominine (African ape and human) clade while in Africa this clade does not appear until about 7 Ma. In any other mammalian lineage this would be taken as unambiguous evidence of dispersal into Africa from Eurasia. In fact, there is widespread agreement that much of the current African fauna (antelopes, suids, giraffes, perissodactyls, orycteropids, rodents, insectivores, small carnivores and hyenas) dispersed into Africa. Here I examine new evidence of hominines in Eurasia and their absence before 7 Ma in Africa.

3. High levels of endemism in East African early Miocene catarrhines: does limited migration play a role?

Cote, S.

Department of Anthropology and Archaeology, University of Calgary

The early Miocene of Kenya and Uganda has a rich and well-calibrated fossil record that samples over 20 species of catarrhine primates. These fossil localities are of considerable interest for primate evolution because they sample some of the oldest known cercopithecoids as well as the oldest putative hominoids. Catarrhines are patchily distributed at these localities. Many species are found only at one locality, despite close temporal and spatial proximity to other seemingly similar fossil localities. This pattern is not observed in other mammalian taxa, and does not appear to be the result of sampling bias or taphonomic factors. Two non-mutually exclusive hypotheses have been proposed to explain the high degree of endemism in early Miocene East African catarrhines: (1) chronological differences and (2) habitat differences. Preliminary analyses of community structure and faunal composition do not show strong evidence for differentiation of forest types, but recent isotopic analyses do suggest that localities in Uganda may sample more open habitats than previously thought. In addition, new dating results for the Moroto, Bukwa, and Napak localities in Uganda have shifted the known age of these sites by up to 2-3 million years, and strongly suggests that the entire sequence needs to be re-dated. A third viable hypothesis is that these catarrhines show high degrees of endemism due to limited migration potential. Each of these fossil sites is associated with a separate volcanic complex that may act as an isolated forest ecosystem separated from other suitable catarrhine habitat by large distances of non-primate habitat. In addition, the volcanoes themselves may each create strong regimes of habitat disturbance via regular volcanic eruptions. Work in progress to test these three hypotheses includes developing an updated chronostratigraphic framework for the entire region, as well as detailed environmental reconstruction using shared methodologies across all localities.

4. Tracking migration in South Africa using serial sampling of dentine for stable isotope analysis

Hopper, C.1, Sealy, J.2, and G. Dewar1

1Department of Anthropology, University of Toronto; 2Department of Archaeology, University of Cape Town

Due to teeth's incremental growth and lack of remodelling, they can provide a wealth of information about an individual's diet, geographic origin, and migratory patterns. In order to examine these topics within the scope of hunter-gatherer/animal interaction, analysis of springbok (*Antidorcus marsupialis*) dental remains recovered from a shell midden located on the Namaqualand coastal plain in South Africa was completed. The site SK400, dated to the Little Ice Age (AD 1500 to AD 1800), contains a substantial number of springbok (MNI=123) deposited during a single anthropogenic mass harvesting event. The faunal remains present a demographic profile consisting of adults and six month old juveniles from both sexes. Although paleoenvironmental proxies indicate that the Little Ice Age was a wet/cold period, the

demographic pattern and seasonality indicators are consistent with the springbok being trapped/hunted during an extremely arid summer while on a “drought trek” in search of water.

In this paper, the stable light isotopic composition of springbok mandibular permanent first molar enamel ($\delta^{13}\text{C}$ and $\delta^{18}\text{O}$) and dentine ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) for nine individuals was prepared and analysed. In order to gain a refined understanding of landscape use by these animals and in turn the humans trapping them, an isotopic serial sampling method was employed. Dentine was collected from the highest cusp at the occlusal surface to the most apical portion of the root, ensuring that at least 10 samples were collected from each tooth. This method was chosen over a whole tooth averaged sampling method in order to facilitate the construction of a sequential isotopic profile for the seasonality of the springbok. In this way, serial sampling of dentine along each tooth provided high- resolution environmental signatures and dietary trends through time for individuals within the group. This research contributes to a growing body of research on migration and land use patterns by southern African hunter-gatherer populations. By using the Little Ice Age as a proxy for Pleistocene glacial/interstadial periods, we can use this data to model mobility and migration patterns during a period of environmental flux, modern human behaviours that ultimately allowed people to migrate out of Africa.

5. Escalation as a motive force in the behavioural evolution of early *Homo* and *Homo erectus*

Hopwood, D.E.

Department of Anthropology, Vancouver Island University

Large bodied carnivorans placed significant selective pressure on early *Homo* and *Homo erectus* populations as they entered the carnivoran guild. How hominins reacted to these pressures had direct implications for the evolution of behaviour. The Hypothesis of Escalation is employed as an interpretive framework to determine if changes in hominin behaviour are a result of escalated, competitive interactions with carnivorans. The hypothesis predicts that if escalation is a cause of evolutionary change there should be long-term trends associated with improving a prey's ability to acquire, defend or prevent enemies, i.e., predators or dangerous competitors, from procuring resources (Vermeij, 1994, 2004). If escalation was a primary factor in the behavioural evolution of early *Homo* and *Homo erectus* there should be long-term improvement in the hominin behavioural repertoire increasing their competitive efficiency. This should be expressed through behavioural variables, such as a more sophisticated tool kit, hominin sites found in more competitive locales and evidence of access to more complete prey carcasses. A multifocal approach, integrating information from carcass acquisition, raw material transportation distance and stone tool use, was utilised to provide a robust understanding of the changing behavioural abilities of early *Homo* and *Homo erectus* between ~2.0 – 0.6 Ma. Changes in the richness of the extinct carnivoran guild were also examined. Hominins demonstrate long-term increases in competitive ability related to alterations in the large carnivoran guild. This is associated with an increase in tool kit complexity, improved cognition, and a capacity to directly compete with other members of the carnivoran guild for carcasses access. Although larger extrinsic factors such as climatic variability may be the ultimate trigger of behavioural change it was the immediacy of competition with large carnivorans that was the proximate determinant.

6. Finding our roots: premolar root morphology evolution within the Plio-Pleistocene hominin clade

Klassen, P.

Institute of Archaeology and Department of Anthropology, University College London

Premolar root morphology is often mentioned within descriptions of new specimens and included in diagnostic traits of species. The development of roots is strongly controlled by genetics and any morphological changes indicate a possible outside influence. Previous studies have shown distinct trends within premolar root morphology between hominin taxa. This study intends to create an evolutionary pathway of the premolar root morphology within the Plio-Pleistocene hominin clade. Analysis of hominin premolars is through the use of microCT scans to examine the external root and internal canal morphologies. Categorizations of both elements are used to trace the evolutionary transition leading to modern *Homo sapiens*. The results confirm previous patterns but include a larger sample with more species than previous studies. There are two patterns observed: a reduction of premolar root and canal number, as well as an increase in number of each, uniquely, in the robust Australopithecines. The reduction of root and canal number is due to a lack of interradicular process activity within the developing teeth. The increase in roots and canals of the robust Australopithecines is from an increase in this activity. The observed patterns indicate that within the hominin clade the root development is strictly controlled.

7. The role of the Balkans in early human migrations to Europe

Roksandic, M.

Department of Anthropology, University of Winnipeg

At the gates to the continent, the Balkan Peninsula represents the most logical route of migration into Europe. Paleontological evidence supports successive movement of animals from Africa / Southwest Asia (SWA) into Europe in the Early and Middle Pleistocene. This notion of successive movement has recently been explored by Denell et al. (2011) and Bermudez del Castro and Martinon-Torres (2013) using a demographic “sinks and sources” model. The authors postulate a demographic source population in SWA, which would have repopulated Europe in successive migrations, intermixing to an extent with humans that were present in southwestern European refugia at the time. The Balkans, lacking any geographic barriers to SWA, represents its logical continuation. For all their importance in allowing the movement of animals and people into Europe, the Balkans should not be conceptualized exclusively as a transit zone. Together with the Iberian and Apennine Peninsulas the Balkans played the role of a refugium for temperate deciduous forests and associated biota. Unlike the more western peninsulas, this region maintained open contact with the rest of the inhabited world. The lack of geographic isolation of the Balkans and their position between the continents links this area to SWA to form what I would like to refer to as the “eastern Mediterranean” geographic entity, a region at the crossroads of the continents that should be conceptualized as the fertilization zone between different populations and their technological traditions. Building on the scant – but growing – fossil human record contextualized by more abundant archaeological data, we examine the evidence for this larger Eastern Mediterranean Communications Area in the Middle and Upper Pleistocene record.

8. What can you do with an ear bone? Phylogenetic and functional inferences from an exceptionally well- preserved Early Eocene primate petrosal (Cambay Shale Formation, India)

Silcox, M.T.¹, Dunn, R.H.², Kumar, K.³, Rana, R.⁴, Sahni, A.⁵, Smith, T.⁶, and K.D. Rose⁷

¹Department of Anthropology, University of Toronto;

²Department of Anatomy, Des Moines University; ³Wadia

Institute of Himalayan Geology; ⁴Garhwal University; ⁵Panjab University; ⁶Directorate Earth & History of Life, Institut Royal des Science Naturelles de Belgique; ⁷Center for Functional Anatomy and Evolution, Johns Hopkins University

The Vastan Lignite mine (Gujarat, India) has yielded a collection of exquisitely preserved primate gnathic and postcranial specimens from the Early Eocene (~54.5 mya) Cambay Shale Formation, including representatives of both of the common Eocene euprimate superfamilies (*Adapoidea*, *Omomyoidea*). The first primate cranial specimen identified from this site is an isolated left petrosal that preserves a partial stapes in anatomical position. The specimen is identified as pertaining to the adapoid *Marcgodinotius indicus* based on an adapoid-like pathway for the branches of the internal carotid artery, and body mass estimates derived from measurements of the semicircular canals. Although representing only a small part of the cranium, the specimen is quite informative both phylogenetically and functionally. From a phylogenetic perspective, it may be significant that the promontorial artery was not contained in a bony tube, a feature more similar to living strepsirhines than haplorhines. Functionally, the specimen preserves a nearly complete cast of the inner ear, allowing for inferences about locomotor behaviour from the semicircular canals and hearing performance from the cochlea and oval window area. The early age and fine quality of preservation of this specimen make it relevant to reconstructing auditory morphology near the base of the primate tree.

9. Hafted hunting weapons and the dispersal of early modern humans: Use-wear evidence from the Magubike archaeological site, Tanzania

Werner, J.J.

Department of Anthropology, University of Alberta

The migration of early modern humans across Africa was likely facilitated to a large degree by the appearance of hafted hunting weaponry during the Middle Stone Age. These tools would have permitted entry into new biomes and allowed for the procurement of a range of different animal resources. Evidence of this technology is often exemplified in Middle Stone Age assemblages by unretouched triangular flakes, sometimes called Levallois points. Nevertheless, the function of these artifacts is often assumed, despite their potential significance. This is due to a number of constraints, most related to the difficulties of performing use-wear analysis on Middle Stone Age artifacts, many of which may be heavily damaged, or manufactured from materials unsuitable for conventional use-wear techniques. However, use-wear methods that rely on plotting edge damage distribution at an assemblage level have been shown to be effective at identifying tool-function for difficult to analyze classes of artifacts. Recently, this technique was applied to points from the Middle Stone Age at Pinnacle Point, South Africa, the results of which implied a scraping rather than projectile function. The methods of that study are replicated here using Middle Stone Age points from the Magubike archaeological site in southern Tanzania. Initial findings demonstrate exaggerated tip-damage, suggesting a possible drilling, piercing or hunting function.

10. Population expansion and contraction: The role of East Africa before and during Out of Africa 2

Willoughby, P.R.

Department of Anthropology, University of Alberta

Since the mid 1980s, it has been clear that our own species, *Homo sapiens*, evolved in Africa sometime around 200,000 years ago. This was towards the end of the Acheulean and the start of the Middle Stone Age (MSA). Descendants of these MSA people subsequently dispersed out of the continent starting around 50,000 years ago, interbred with indigenous people in Eurasia, and ultimately settled the globe. But what was happening in sub-Saharan Africa at the time? In many regions, glacial periods saw increasing dry and cold conditions and local extinction of plants, animals, and possibly hominins as well. But, somewhat surprisingly, palaeoanthropological evidence collected over the past decade by members of IRAP, the Iringa Region Archaeological Project, and others, shows that the Southern Highlands of Iringa, Tanzania may have been more or less continuously occupied over the past 200,000+ years. This region seems to be little affected by glacial expansions and retreats. This presentation presents a review of the palaeoenvironmental, palaeontological and archaeological data supporting the argument for continuous occupation of the Iringa highlands over the course of the late Pleistocene and beyond. This region might have been a refugium during cold, dry, glacial phases. As such, it may have had a central role in the survival of the most recent common ancestral human population and in their dispersal out of the continent.