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NOTICES

PUBLICATION ALERTS

If you have had a paper or book published, or you see something which would be of interest to the group, please send me a publication alert so that I can include it in the newsletter. Many thanks to those who have already sent in alerts.

If there is a journal you feel I should be tracking on a regular basis, let me know.

And if you have any other ideas for extending the “EAORC experience”, please contact me.

ARXIV PREPRINTS – World-wide Evidence for Gender Difference in Sociality

TAMAS DAVID-BARRETT – World-wide Evidence for Gender Difference in Sociality

One of the most contested questions about human behaviour is whether there are inherent sex or gender differences in the formation and maintenance of social bonds. On one hand, female and male brains are structurally almost identical, and while there are sex differences in the endocrine system, these are small, while much of gendered identity and behaviour is learned. On the other hand, sex differences in some aspects of social behaviour have deep evolutionary roots, and are widely present in non-human animals. This observational study recorded the frequency of same-aged, adult human groups appearing in public spaces through 2636 hours, recording group formation by 1.2mn people via 170 research assistants in 46 countries across the world. The results show (a) a significant sex-gender difference in same-sex-same-age frequency, in that ~50% more female-female than male-male pairs are observed in public spaces globally, and (b) that despite regional variation, the patterns holds up in every global region. This is the first study of sex-gender difference in dyadic social behaviour across the world on this scale, and the first global study that uses direct rather than internet-based observations.

<https://arxiv.org/abs/2203.02964>

CONFERENCE ALERT – EVOLUTION 2022, the joint annual meeting of the ASN, SSB, and SSE

Registration is now open for EVOLUTION 2022, the joint annual meeting of the ASN, SSB, and SSE.

Evolution 2022 is hybrid:

June 21 & 22: virtual conference

June 24-28: in-person in Cleveland, OH

For ALL the details and to register: <http://www.evolutionmeetings.org>

HIGHLIGHTS

* Talk & poster submission are available once you complete main registration.

* Talk sign-up is first-come, first-served, with submissions accepted until all slots fill or until May 15, WHICHEVER IS EARLIER.

- * All posters are accepted until June 1.
- * Hotel accommodations are open for booking; dorms coming soon.
- * Conference-ending Super social will be a private event at the Rock & Roll Hall of Fame
- * Early registration discount ends May 1
- * There are several participation/travel support programs; details online
- * Those hoping to compete for the SSB Mayr or SSE Hamilton awards should pay careful attention to instructions:
<https://www.evolutionmeetings.org/student-awards.html>
- * You must be vaccinated and follow our covid health policies to attend the in-person meeting:
<https://www.evolutionmeetings.org/covid-19-information.html>
- * Plans are in place for free on-site daycare; final decision in mid-Apr. ahead of early registration deadline

Howard Rundle hrundle@uottawa.ca

NEWS

SCIENCE DAILY – How the human brain separates, stores, and retrieves memories

Researchers have identified two types of cells in our brains that are involved in organizing discrete memories based on when they occurred. This finding improves our understanding of how the human brain forms memories and could have implications in memory disorders such as Alzheimer's disease.

<https://www.sciencedaily.com/releases/2022/03/220307113145.htm>

SCIENCE DAILY – Prehistoric humans recycled stone tools to preserve memory of ancestors

A new study asks what drove prehistoric humans to collect and recycle flint tools that had been made, used, and discarded by their predecessors. After examining flint tools from one layer at the 500,000-year-old prehistoric site of Revadim in the south of Israel's Coastal Plain, researchers propose a novel explanation: prehistoric humans, just like us, were collectors by nature and culture.

<https://www.sciencedaily.com/releases/2022/03/220307113131.htm>

SCIENCE DAILY – The language of the eyes

What is the significance of the sclera of our eyes? A question which researchers have been interested in for some time now. Recently a research team led by a comparative psychologist has succeeded in deciphering the mystery: The white of the eye contributes decisively to the visibility of directions of gaze through its basic color properties.

<https://www.sciencedaily.com/releases/2022/03/220308102743.htm>

SCIENCE DAILY – Non-social jays surprise scientists by learning as skillfully as birds living in groups

The California scrub-jay, a generally non-social bird, can learn just as well as another species of jay that lives in groups, a finding that surprised animal intelligence researchers who devised a novel food puzzle to study cognition in the wild.

<https://www.sciencedaily.com/releases/2022/03/220309165538.htm>

SOCIETY FOR SCIENCE – Ancient Homo sapiens took a talent for cultural creativity from Africa to Asia

Excavations at two sites continents apart show that Stone Age hominids got culturally inventive starting nearly 100,000 years ago.

<http://click.societyforscience-email.com/?qs=c1bb954aca675ebb03b4e591df8f4445751a1e74203d10693f984ff138fb9598a3ddbc1f09f2340db816f723d3a653a85afc39fd3093c556e50162236ab781>

THE CONVERSATION – Monkey teeth are shedding new light on how early humans used tools

Macaque tooth wear was identical to our ancestors, throwing into question the long-held belief that tool use caused the markings on hominin tooth fossils.

<https://theconversationuk.cmail20.com/t/r-l-tyoxy-khhilalhh-s/>

PUBLICATIONS

Current Biology

PAPERS

SHYAMALIKA GOPALAN et al – Hunter-gatherer genomes reveal diverse demographic trajectories during the rise of farming in Eastern Africa

The fate of hunting and gathering populations following the rise of agriculture and pastoralism remains a topic of debate in the study of human prehistory. Studies of ancient and modern genomes have found that autochthonous groups were largely

replaced by expanding farmer populations with varying levels of gene flow, a characterization that is influenced by the almost universal focus on the European Neolithic. We sought to understand the demographic impact of an ongoing cultural transition to farming in Southwest Ethiopia, one of the last regions in Africa to experience such shifts. Importantly, Southwest Ethiopia is home to several of the world's remaining hunter-gatherer groups, including the Chabu people, who are currently transitioning away from their traditional mode of subsistence. We generated genome-wide data from the Chabu and four neighboring populations, the Majang, Shekkacho, Bench, and Sheko, to characterize their genetic ancestry and estimate their effective population sizes over the last 60 generations. We show that the Chabu are a distinct population closely related to ancient people who occupied Southwest Ethiopia >4,500 years ago. Furthermore, the Chabu are undergoing a severe population bottleneck, which began approximately 1,400 years ago. By analyzing eleven Eastern African populations, we find evidence for divergent demographic trajectories among hunter-gatherer-descendant groups. Our results illustrate that although foragers respond to encroaching agriculture and pastoralism with multiple strategies, including cultural adoption of agropastoralism, gene flow, and economic specialization, they often face population decline.

[https://www.cell.com/current-biology/fulltext/S0960-9822\(22\)00314-1](https://www.cell.com/current-biology/fulltext/S0960-9822(22)00314-1)

eLife

PAPERS

FUMIHIRO KANO, YURI KAWAGUCHI & YEOW HANLING – Experimental evidence that uniformly white sclera enhances the visibility of eye-gaze direction in humans and chimpanzees

Hallmark social activities of humans, such as cooperation and cultural learning, involve eye-gaze signaling through joint attentional interaction and ostensive communication. The gaze-signaling and related cooperative-eye hypotheses posit that humans evolved unique external eye morphologies, including uniformly white sclera (the whites of the eye), to enhance the visibility of eye-gaze for conspecifics. However, experimental evidence is still lacking. This study tested the ability of human and chimpanzee participants to discriminate the eye-gaze directions of human and chimpanzee images in computerized tasks. We varied the level of brightness and size in the stimulus images to examine the robustness of the eye-gaze directional signal against simulated shading and distancing. We found that both humans and chimpanzees discriminated eye-gaze directions of humans better than those of chimpanzees, particularly in visually challenging conditions. Also, participants of both species discriminated the eye-gaze directions of chimpanzees better when the contrast polarity of the chimpanzee eye was reversed compared to when it was normal; namely, when the chimpanzee eye has human-like white sclera and a darker iris. Uniform whiteness in the sclera thus facilitates the visibility of eye-gaze direction even across species. Our findings thus support but also critically update the central premises of the gaze-signaling hypothesis.

<https://elifesciences.org/articles/74086>

Evolutionary Human Sciences

PAPERS

MICHAEL S. A. GRAZIANO – The Origin of Smiling, Laughing, and Crying: The Defensive Mimic Theory

Why do we leak lubricant from the eyes to solicit comfort from others? Why do we bare our teeth and crinkle our faces to express nonaggression? The defensive mimic theory proposes that a broad range of human emotional expressions evolved originally as exaggerated, temporally extended mimics of the fast, defensive reflexes that normally protect the body surface. Defensive reflexes are so important to survival that they cannot be safely suppressed; yet they also broadcast information about an animal's internal state, information that can potentially be exploited by other animals. Once others can observe and exploit an animal's defensive reflexes, it may be advantageous to the animal to run interference by creating mimic defensive actions, thereby manipulating the behavior of others. Through this interaction over millions of years, many human emotional expressions may have evolved. Here, human social signals including smiling, laughing, and crying, are compared component-by-component to the known, well-studied features of primate defensive reflexes. It is suggested that the defensive mimic theory can adequately account for the physical form of not all, but a large range of human emotional expression.

<https://www.cambridge.org/core/journals/evolutionary-human-sciences/article/origin-of-smiling-laughing-and-crying-the-defensive-mimic-theory/A7B90BC9886FA555E08986E2962AD601>

Frontiers in Ecology and Evolution

PAPERS

ARTURO CUEVA-TEMPRANA et al with MICHAEL PETRAGLIA – Oldowan Technology Amid Shifting Environments ~2.03–1.83 Million Years Ago

The Oldowan represents the earliest recurrent evidence of human material culture and one of the longest-lasting forms of technology. Its appearance across the African continent amid the Plio-Pleistocene profound ecological transformations, and posterior dispersal throughout the Old World is at the foundation of hominin technological dependence. However, uncertainties exist concerning the degree to which the Oldowan constitutes an environment-driven behavioral adaptation. Moreover, it is necessary to understand how Oldowan technology varied through time in response to hominin ecological demands. In this study, we present the stone tool assemblage from Ewass Oldupa, a recently discovered archeological site that signals the earliest hominin occupation of Oldupai Gorge (formerly Olduvai) ~2.03 Ma. At Ewass Oldupa, hominins underwent marked environmental shifts over the course of a ~200 kyr period. In this article, we deployed an analysis that

combines technological and typological descriptions with an innovative quantitative approach, the Volumetric Reconstruction Method. Our results indicate that hominins overcame major ecological challenges while relying on technological strategies that remained essentially unchanged. This highlights the Oldowan efficiency, as its basic set of technological traits was able to sustain hominins throughout multiple environments.

<https://www.frontiersin.org/articles/10.3389/fevo.2022.788101/full>

Frontiers in Neuroscience

ARTICLES

JAMES KROGER & CHOBOK KIM – Frontopolar Cortex Specializes for Manipulation of Structured Information

It is only in the last 20 years that frontopolar cortex (FPC) has been recognized as distinct anatomically and functionally from dorsolateral prefrontal cortex (DLPFC). It has appeared to be recruited for complex or abstract cognition, and as a result has been thought to be responsible for the most sophisticated human understanding (Thiebaut de Schotten et al., 2017, #27). In this perspective article, we review recent thinking about frontal lobe organization, evidence bringing it into question, and revisit an alternative view of FPC function. We then present an original study arising from that view that demonstrates a new specialization of FPC.

<https://www.frontiersin.org/articles/10.3389/fnsys.2022.788395/full>

Nature

PAPERS

ANUJ K. SHAH & MICHAEL LAFOREST – Knowledge about others reduces one's own sense of anonymity

Social ties often seem symmetric, but they need not be. For example, a person might know a stranger better than the stranger knows them. We explored whether people overlook these asymmetries and what consequences that might have for people's perceptions and actions. Here we show that when people know more about others, they think others know more about them. Across nine laboratory experiments, when participants learned more about a stranger, they felt as if the stranger also knew them better, and they acted as if the stranger was more attuned to their actions. As a result, participants were more honest around known strangers. We tested this further with a field experiment in New York City, in which we provided residents with mundane information about neighbourhood police officers. We found that the intervention shifted residents' perceptions of officers' knowledge of illegal activity, and it may even have reduced crime. It appears that our sense of anonymity depends not only on what people know about us but also on what we know about them.

<https://www.nature.com/articles/s41586-022-04452-3>

Nature Ecology & Evolution

OBITUARIES

CORRIE S. MOREAU & NAOMI E. PIERCE – Edward O. Wilson (1929–2021)

Professor Edward O. Wilson, who died on 26 December 2021 at the age of 92, was one of the leading biologists of the twentieth and twenty-first centuries. His contributions to science were wide ranging, including theories to explain biological diversity, establishing the evolutionary underpinnings of social behaviour and advocating powerfully for conservation. His accessible writing extended his impact far beyond academia and inspired countless readers to follow a career in science. He did this while always retaining the kindness and generosity of a true 'southern gentleman'.

<https://www.nature.com/articles/s41559-022-01680-8>

Nature Humanities & Social Sciences Communications

PAPERS

ELISA BANDINI, RACHEL A. HARRISON & ALBA MOTES-RODRIGO – Examining the suitability of extant primates as models of hominin stone tool culture

Extant primates, especially chimpanzees, are often used as models for pre-modern hominin (henceforth: hominin) behaviour, anatomy and cognition. In particular, as hominin behaviour cannot be inferred from archaeological remains and artefacts alone, extant primates (including modern humans) are used as a 'time machine' to reconstruct the technological repertoires of our early ancestors. Whilst many continue to use primates to approximate hominin tool behaviours, others have questioned the value of these comparisons. The aim of this review is to critically examine how previous studies have compared various primate species to hominins with regards to stone percussion and flaking, as well as to discuss the limitations and strengths of these comparisons. Evidence is presented to support the view that certain monkey species, alongside non-primate animal species, might provide important insights when reconstructing hominin stone tool culture, despite being phylogenetically further removed from our lineage. In conclusion, whilst some studies may inflate the value of primates as models for early hominins, data from extant primates, alongside the archaeological record and anthropological reports, can help create a more comprehensive picture of hominin stone tool culture.

<https://www.nature.com/articles/s41599-022-01091-x>

Nature Neuroscience

PAPERS

ARIEL GOLDSTEIN et al – Shared computational principles for language processing in humans and deep language models

Departing from traditional linguistic models, advances in deep learning have resulted in a new type of predictive (autoregressive) deep language models (DLMs). Using a self-supervised next-word prediction task, these models generate appropriate linguistic responses in a given context. In the current study, nine participants listened to a 30-min podcast while their brain responses were recorded using electrocorticography (ECoG). We provide empirical evidence that the human brain and autoregressive DLMs share three fundamental computational principles as they process the same natural narrative: (1) both are engaged in continuous next-word prediction before word onset; (2) both match their pre-onset predictions to the incoming word to calculate post-onset surprise; (3) both rely on contextual embeddings to represent words in natural contexts. Together, our findings suggest that autoregressive DLMs provide a new and biologically feasible computational framework for studying the neural basis of language.

<https://www.nature.com/articles/s41593-022-01026-4>

Nature Reviews Psychology

PAPERS

HANNES RAKOCZY – Foundations of theory of mind and its development in early childhood

Theory of mind is the human conceptual capacity to understand other people as agents who have subjective mental states such as beliefs, desires, and intentions. It is the basis of distinctively human forms of social understanding and interaction that are essential for communication, cooperation, and culture. In this Review, I summarize the current state of research about the emergence and development of theory of mind in early childhood. I describe the typical developmental trajectory and review findings about the cognitive, linguistic, social and neural foundations of theory of mind development. Finally, I review an ongoing debate regarding whether there are different — implicit versus explicit — forms of theory of mind that develop independently, and conclude by providing an outlook on future challenges and perspectives for research in this area.

<https://www.nature.com/articles/s44159-022-00037-z>

Nature Scientific Reports

PAPERS

E. M. J. SCHOTSMANS et al – New insights on commemoration of the dead through mortuary and architectural use of pigments at Neolithic Çatalhöyük, Turkey

Çatalhöyük (Turkey, 7100–5950 cal BC) provides a unique case study for the exploration of links between pigments in burials, demographic data and colourants in contemporary architectural contexts. This study presents the first combined analysis of funerary and architectural evidence of pigment use in Neolithic Anatolia and discusses the possible social processes underlying the observed statistical patterns. Results reveal that pigments were either applied directly to the deceased or included in the grave as a burial association. The most commonly used pigment was red ochre. Cinnabar was mainly applied to males and blue/green pigment was associated with females. A correlation was found between the number of buried individuals and the number of painted layers in the buildings. Mortuary practices seem to have followed specific selection processes independent of sex and age-at-death of the deceased. This study offers new insights about the social factors involved in pigment use in this community, and contributes to the interpretation of funerary practices in Neolithic Anatolia. Specifically, it suggests that visual expression, ritual performance and symbolic associations were elements of shared long-term socio-cultural practices.

<https://www.nature.com/articles/s41598-022-07284-3>

LUCY TIMBRELL et al with JAMES BLINKHORN – A spatiotemporally explicit paleoenvironmental framework for the Middle Stone Age of eastern Africa

Eastern Africa has played a prominent role in debates about human evolution and dispersal due to the presence of rich archaeological, palaeoanthropological and palaeoenvironmental records. However, substantial disconnects occur between the spatial and temporal resolutions of these data that complicate their integration. Here, we apply high-resolution climatic simulations of two key parameters, mean annual temperature and precipitation, and a biome model, to produce a highly refined characterisation of the environments inhabited during the eastern African Middle Stone Age. Occupations are typically found in sub-humid climates and landscapes dominated by or including tropical xerophytic shrubland. Marked expansions from these core landscapes include movement into hotter, low-altitude landscapes in Marine Isotope Stage 5 and cooler, high-altitude landscapes in Marine Isotope Stage 3, with the recurrent inhabitation of ecotones between open and forested habitats. Through our use of high-resolution climate models, we demonstrate a significant independent relationship between past precipitation and patterns of Middle Stone Age stone tool production modes overlooked by previous studies. Engagement with these models not only enables spatiotemporally explicit examination of climatic variability across Middle Stone Age occupations in eastern Africa but enables clearer characterisation of the habitats early human populations were adapted to, and how they changed through time.

<https://www.nature.com/articles/s41598-022-07742-y>

R. BRAUCHER et al with the ASTER TEAM – In situ-produced ^{10}Be and ^{26}Al indirect dating of Elarmékora Earlier Stone Age artefacts: first attempt in a savannah forest mosaic in the middle Ogooué valley, Gabon

Discovered in 1988 by R. Oslisly and B. Peyrot, Elarmékora is a high terrace that, today, is situated 175 m above the Ogooué River in the historical complex of Elarmékora, attached to the Lopé National Park in Gabon, a World Heritage site since 2007. The site yielded a small lithic assemblage, including mainly cobble artefacts embedded within the 1 m thick alluvial material. Based on geomorphological and palaeoclimatological criteria, the preliminary dating suggested an age of 400 ka. However, Elarmékora could be a key site for Atlantic Central Africa if this lithic industry can be dated absolutely. In 2018 and 2019, two field trips were organized to collect surface samples as well as samples in vertical depth profiles with the aim of measuring their in situ-produced cosmogenic nuclide (^{10}Be and ^{26}Al) content. Results suggest a surface abandonment between 730 and 620 ka ago representing a minimum age for the cobble artefacts. Concurrently, technological reappraisal of the artefacts suggests an atypical lithic industry that should, for the moment, be considered as ‘undiagnostic’ Earlier Stone Age. This age bracketing may be compared with a similar age range obtained for prehistoric occupations in Angola using the same approach. This age will place Elarmékora among the oldest evidence for the presence of hominins in western Central Africa and raises the question of a ‘West Side Story’ to early human dispersals in Africa.

<https://royalsocietypublishing.org/doi/full/10.1098/rstb.2020.0482>

WILLIAM D. GOSLING, ELEANOR M. L. SCERRI & STEFANIE KABOTH-BAHR – The climate and vegetation backdrop to hominin evolution in Africa

The most profound shift in the African hydroclimate of the last 1 million years occurred around 300 thousand years (ka) ago. This change in African hydroclimate is manifest as an east-west change in moisture balance that cannot be fully explained through linkages to high latitude climate systems. The east-west shift is, instead, probably driven by a shift in the tropical Walker Circulation related to sea surface temperature change driven by orbital forcing. Comparing records of past vegetation change, and hominin evolution and development, with this breakpoint in the climate system is challenging owing to the paucity of study sites available and uncertainties regarding the dating of records. Notwithstanding these uncertainties we find that, broadly speaking, both vegetation and hominins change around 300 ka. The vegetative backdrop suggests that relative abundance of vegetative resources shifted from western to eastern Africa, although resources would have persisted across the continent. The climatic and vegetation changes probably provided challenges for hominins and are broadly coincident with the appearance of *Homo sapiens* (ca 315 ka) and the emergence of Middle Stone Age technology. The concomitant changes in climate, vegetation and hominin evolution suggest that these factors are closely intertwined.

<https://royalsocietypublishing.org/doi/abs/10.1098/rstb.2020.0483>

NICHOLAS TAYLOR – Riddles wrapped inside an enigma. Lupemban MSA technology as a rainforest adaptation: revisiting the lanceolate point

The Central African Stone Age is very poorly known when compared to the higher-resolution records of East and Southern Africa. Early Stone Age (ESA) archaeology is effectively absent from the rainforest zone, with the early Middle Stone Age (MSA) Lupemban industry representing the earliest sustained archaeological signature. Uranium-series dates of approximately 265 ka BP for the Lupemban at Twin Rivers (Zambia), although queried, suggest a precocious late Middle Pleistocene dispersal of early *Homo sapiens* into the equatorial rainforest belt. Lupemban palaeohabitat interactions and attendant behavioural and technological repertoires are key to its evolutionary significance, but investigation is hampered by the widespread vertical disturbance of stratigraphic profiles and the formation of ‘stone-lines’. The Lupemban takes in a range of implement types and technologies, including core-axes, prepared core technology (PCT) points, blades and backed blades. But it is the elongated bifacial lanceolate point—some exquisitely made and many exceeding 30 cm in length—that defines the industry. Remarkably, unequivocal examples of these iconic artefacts have never been the focus of detailed techno-typological scrutiny. In this paper, I advance understanding of the Lupemban by initiating a re-consideration of lanceolate points at Kalambo Falls, Zambia, and discuss their implications for the Lupemban’s evolutionary significance.

<https://royalsocietypublishing.org/doi/abs/10.1098/rstb.2020.0484>

JAMES BLINKHORN et al – Evaluating refugia in recent human evolution in Africa

Homo sapiens have adapted to an incredible diversity of habitats around the globe. This capacity to adapt to different landscapes is clearly expressed within Africa, with Late Pleistocene *Homo sapiens* populations occupying savannahs, woodlands, coastlines and mountainous terrain. As the only area of the world where *Homo sapiens* have clearly persisted through multiple glacial-interglacial cycles, Africa is the only continent where classic refugia models can be formulated and tested to examine and describe changing patterns of past distributions and human phylogeographies. The potential role of refugia has frequently been acknowledged in the Late Pleistocene palaeoanthropological literature, yet explicit identification of potential refugia has been limited by the patchy nature of palaeoenvironmental and archaeological records, and the low temporal resolution of climate or ecological models. Here, we apply potential climatic thresholds on human habitation, rooted in ethnographic studies, in combination with high-resolution model datasets for precipitation and biome distributions to identify persistent refugia spanning the Late Pleistocene (130–10 ka). We present two alternate models suggesting that

between 27% and 66% of Africa may have provided refugia to Late Pleistocene human populations, and examine variability in precipitation, biome and ecotone distributions within these refugial zones.

<https://royalsocietypublishing.org/doi/full/10.1098/rstb.2020.0485>

EMUOBOSA AKPO ORIJEMIE – Human behaviour and climate-linked fluctuations in the rainforests of West-Central Africa

Africa, the cradle of human evolution, has one of the largest and most diverse rainforests in the world. The African rainforests contain evidence of human occupation as well as fluctuating climate during the Pleistocene; such evidence offers archaeologists and palaeoecologists the opportunity to understand how climatic fluctuations have influenced human behaviour. However, compared to the rainforests environments in Asia and South America, the human ecological history of those in West-Central Africa is poorly understood. This is because of comparatively fewer scientific programmes which synergize palaeoecological and archaeological data and thus could enhance the knowledge and allow for an evaluation of the impact of climatic fluctuations on human behaviour in the rainforests of West-Central Africa during the Pleistocene and Holocene periods. The goals of this paper are twofold, namely: (i) to provide a synthesis of the past climatic variability in the rainforests of West-Central Africa, and (ii) to demonstrate the influence of such variability on human behaviour during the Pleistocene to Holocene periods. It is hoped that this paper will stimulate Africanists to adopt an inclusive scientific anthropological and palaeoecological approach in understanding human–climate interactions in the West-Central African rainforests.

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ADAM H. BOYETTE et al – Social ties in the Congo Basin: Insights into tropical forest adaptation from BaYaka and their neighbours

Investigating past and present human adaptation to the Congo Basin tropical forest can shed light on how climate and ecosystem variability have shaped human evolution. Here, we first review and synthesize genetic, palaeoclimatological, linguistic and historical data on the peopling of the Congo Basin. While forest fragmentation led to the increased genetic and geographical divergence of forest foragers, these groups maintained long-distance connectivity. The eventual expansion of Bantu speakers into the Congo Basin provided new opportunities for forging inter-group links, as evidenced by linguistic shifts and historical accounts. Building from our ethnographic work in the northern Republic of the Congo, we show how these inter-group links between forest forager communities as well as trade relationships with neighbouring farmers facilitate adaptation to ecoregions through knowledge exchange. While researchers tend to emphasize forager–farmer interactions that began in the Iron Age, we argue that foragers' cultivation of relational wealth with groups across the region played a major role in the initial occupation of the Congo Basin and, consequently, in cultural evolution among the ancestors of contemporary peoples.

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JULIEN LOUYS et al – Speleological and environmental history of Lida Ajer cave, western Sumatra

Some of the earliest evidence for the presence of modern humans in rainforests has come from the fossil deposits of Lida Ajer in Sumatra. Two human teeth from this cave were estimated to be 73–63 thousand years old, which is significantly older than some estimates of modern human migration out of Africa based on genetic data. The deposits were interpreted as being associated with a rainforest environment based largely on the presence of abundant orangutan fossils. As well as the main fossil-bearing chamber, fossil-bearing passages are present below a sinkhole, although the relationship between the different fossil deposits has only been tenuously established. Here, we provide significant new sedimentological, geochronological and palaeoecological data aimed at reconstructing the speleological and environmental history of the cave and the clastic and fossil deposits therein. Our data suggest that the Lida Ajer fossils were deposited during Marine Isotope Stage 4, with fossils from the lower passages older than the main fossil chamber. Our use of stable carbon and oxygen isotope analyses of mammalian tooth enamel demonstrates that early humans probably occupied a closed-canopy forest very similar to those present in the region today, although the fossil orangutans may have occupied a slightly different niche.

<https://royalsocietypublishing.org/doi/full/10.1098/rstb.2020.0494>

CONOR MCADAMS et al with MIKE W. MORLEY – Late Pleistocene shell midden microstratigraphy indicates a complex history of human–environment interactions in the uplands of North Vietnam

North Vietnam is situated on a major route of Pleistocene hominin dispersal in East Asia, and the area's karstic caves preserve many prehistoric shell middens. Fossil and genomic evidence suggest a complex human history in this region and more widely across Southeast Asia and southern China, but related archaeological investigations are hampered by challenging site stratigraphies. Recent investigations of shell middens in other geographical settings have revealed the microstratigraphic complexity of these anthropogenic deposits. But caves promote distinctive site formation processes, while tropical climates may catalyse geomorphic and diagenetic changes. These environmental factors complicate the interpretation of North Vietnam's shell middens and constraining their effects upon the formation, preservation and destruction of these sites is critical to understanding the archaeology of this region. We examine two archaeological cave sites, dated to the Late Pleistocene and located in the limestone uplands surrounding the Hanoi Basin. Each contains multiple shell midden layers associated with prehistoric occupation and burials. Using thin-section micromorphology

(microstratigraphy), we reconstruct the depositional and post-depositional histories of these sites, presenting a geoarchaeological framework of interpretation that is applicable to shell middens in mainland Southeast Asia and tropical zones more widely. This work represents a further step towards improving our understanding of prehistoric human dispersals and adaptations in this region.

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PATRICK ROBERTS et al – Fossils, fish and tropical forests: prehistoric human adaptations on the island frontiers of Oceania

Oceania is a key region for studying human dispersals, adaptations and interactions with other hominin populations. Although archaeological evidence now reveals occupation of the region by approximately 65–45 000 years ago, its human fossil record, which has the best potential to provide direct insights into ecological adaptations and population relationships, has remained much more elusive. Here, we apply radiocarbon dating and stable isotope approaches to the earliest human remains so far excavated on the islands of Near and Remote Oceania to explore the chronology and diets of the first preserved human individuals to step across these Pacific frontiers. We demonstrate that the oldest human (or indeed hominin) fossil outside of the mainland New Guinea-Aru area dates to approximately 11 800 years ago. Furthermore, although these early sea-faring populations have been associated with a specialized coastal adaptation, we show that Late Pleistocene–Holocene humans living on islands in the Bismarck Archipelago and in Vanuatu display a persistent reliance on interior tropical forest resources. We argue that local tropical habitats, rather than purely coasts or, later, arriving domesticates, should be emphasized in discussions of human diets and cultural practices from the onset of our species' arrival in this part of the world.

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M. B. BUSH et al – A palaeoecological perspective on the transformation of the tropical Andes by early human activity

Palaeoecological records suggest that humans have been in the Andes since at least 14 000 years ago. Early human impacts on Andean ecosystems included an increase in fire activity and the extinction of the Pleistocene megafauna. These changes in Andean ecosystems coincided with rapid climate change as species were migrating upslope in response to deglacial warming. Microrefugia probably played a vital role in the speed and genetic composition of that migration. The period from ca 14 500 to 12 500 years ago was when novel combinations of plant species appeared to form no-analogue assemblages in the Andes. By 12 000 years ago most areas in what are today the Andean grasslands were being burned and modified by human activity. As the vegetation of these highland settings has been modified by human activity for the entirety of the Holocene, they should be regarded as long-term manufactured landscapes. The sharp tree lines separating Andean forests from grasslands that we see today were probably also created by repeated burning and owe their position more to human-induced fire than climatic constraints. In areas that were readily penetrated by humans on the forested slopes of the Andes, substantial modification and settlement had occurred by the mid-Holocene. In hard-to-reach areas, however, the amount of human modification may always have been minimal, and these slopes can be considered as being close to natural in their vegetation.

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JOSÉ IRIARTE et al – Ice Age megafauna rock art in the Colombian Amazon?

Megafauna paintings have accompanied the earliest archaeological contexts across the continents, revealing a fundamental inter-relationship between early humans and megafauna during the global human expansion as unfamiliar landscapes were humanized and identities built into new territories. However, the identification of extinct megafauna from rock art is controversial. Here, we examine potential megafauna depictions in the rock art of Serranía de la Lindosa, Colombian Amazon, that includes a giant sloth, a gomphothere, a camelid, horses and three-toed ungulates with trunks. We argue that they are Ice Age rock art based on the (i) naturalistic appearance and diagnostic morphological features of the animal images, (ii) late Pleistocene archaeological dates from La Lindosa confirming the contemporaneity of humans and megafauna, (iii) recovery of ochre pigments in late Pleistocene archaeological strata, (iv) the presence of most megafauna identified in the region during the late Pleistocene as attested by archaeological and palaeontological records, and (v) widespread depiction of extinct megafauna in rock art across the Americas. Our findings contribute to the emerging picture of considerable geographical and stylistic variation of geometric and figurative rock art from early human occupations across South America. Lastly, we discuss the implications of our findings for understanding the early human history of tropical South America.

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Proceedings of the Royal Society B

PAPERS

JASMEEN KANWAL & ANDY GARDNER – Population viscosity promotes altruism under density-dependent dispersal

A basic mechanism of kin selection is population viscosity, whereby individuals do not move far from their place of birth and hence tend to be surrounded by relatives. In such circumstances, even indiscriminate altruism among neighbours will often involve interactions between kin, which has a promoting effect on the evolution of altruism. This has the potential to explain altruistic behaviour across the whole tree of life, including in taxa for which recognition of kin is implausible. However, population viscosity may also intensify resource competition among kin, which has an inhibitory effect on altruism. Indeed, in the simplest scenario, in which individuals disperse with a fixed probability, these two effects have been shown to exactly

cancel such that there is no net impact of viscosity on altruism. Here, we show that if individuals are able to disperse conditionally upon local density, they are favoured to do so, with more altruistic neighbourhoods exhibiting a higher rate of dispersal and concomitant relaxation of kin competition. Comparing across different populations or species, this leads to a negative correlation between overall levels of dispersal and altruism. We demonstrate both analytically and using individual-based simulations that population viscosity promotes the evolution of altruism under density-dependent dispersal.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2021.2668>

TIM SAINBURG, ANNA MAI & TIMOTHY Q. GENTNER – Long-range sequential dependencies precede complex syntactic production in language acquisition

To convey meaning, human language relies on hierarchically organized, long-range relationships spanning words, phrases, sentences and discourse. As the distances between elements (e.g. phonemes, characters, words) in human language sequences increase, the strength of the long-range relationships between those elements decays following a power law. This power-law relationship has been attributed variously to long-range sequential organization present in human language syntax, semantics and discourse structure. However, non-linguistic behaviours in numerous phylogenetically distant species, ranging from humpback whale song to fruit fly motility, also demonstrate similar long-range statistical dependencies. Therefore, we hypothesized that long-range statistical dependencies in human speech may occur independently of linguistic structure. To test this hypothesis, we measured long-range dependencies in several speech corpora from children (aged 6 months–12 years). We find that adult-like power-law statistical dependencies are present in human vocalizations at the earliest detectable ages, prior to the production of complex linguistic structure. These linguistic structures cannot, therefore, be the sole cause of long-range statistical dependencies in language.

<https://royalsocietypublishing.org/doi/full/10.1098/rspb.2021.2657>

NICOLAS FAY et al with SUSAN GOLDIN-MEADOW – Gesture is the primary modality for language creation

How language began is one of the oldest questions in science, but theories remain speculative due to a lack of direct evidence. Here, we report two experiments that generate empirical evidence to inform gesture-first and vocal-first theories of language origin; in each, we tested modern humans' ability to communicate a range of meanings (995 distinct words) using either gesture or non-linguistic vocalization. Experiment 1 is a cross-cultural study, with signal Producers sampled from Australia ($n = 30$, Mage = 32.63, s.d. = 12.42) and Vanuatu ($n = 30$, Mage = 32.40, s.d. = 11.76). Experiment 2 is a cross-experiential study in which Producers were either sighted ($n = 10$, Mage = 39.60, s.d. = 11.18) or severely vision-impaired ($n = 10$, Mage = 39.40, s.d. = 10.37). A group of undergraduate student Interpreters guessed the meaning of the signals created by the Producers ($n = 140$). Communication success was substantially higher in the gesture modality than the vocal modality (twice as high overall; 61.17% versus 29.04% success). This was true within cultures, across cultures and even for the signals produced by severely vision-impaired participants. The success of gesture is attributed in part to its greater universality (i.e. similarity in form across different Producers). Our results support the hypothesis that gesture is the primary modality for language creation.

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Trends in Ecology and Evolution

PAPERS

ANTÓNIO M.M. RODRIGUES & ANDY GARDNER – Reproductive value and the evolution of altruism

Altruism is favored by natural selection provided that it delivers sufficient benefits to relatives. An altruist's valuation of her relatives depends upon the extent to which they carry copies of her genes – relatedness – and also on the extent to which they are able to transmit their own genes to future generations – reproductive value. However, although relatedness has received a great deal of attention with regard to altruism, reproductive value has been surprisingly neglected. We review how reproductive value modulates patterns of altruism in relation to individual differences in age, sex, and general condition, and discuss how social partners may manipulate each other's reproductive value to incentivize altruism. This topic presents opportunities for tight interplay between theoretical and empirical research.

[https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347\(21\)00312-8](https://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347(21)00312-8)

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