EAORC BULLETIN 1,166 – 19 October 2025

CONTENTS

NOTICES **3**
FORMATTED VERSION OF THIS BULLETIN 3
PUBLICATION ALERTS 3
EDITORIAL INTERJECTIONS 3
ACADEMIA.EDU – The evolution of hominin skeletal muscle 3
SAMANTHA R. QUEENO et al – Human and African ape myosin heavy chain content and the evolution of hominin skeletal muscle 3
ACADEMIA.EDU – ~2-million-year-old hominin pelvis (DNH 43) from Drimolen Main Quarry 3
ELLIE BERG et al – Further assessment of a ~2-million-year-old hominin pelvis (DNH 43) from Drimolen Main Quarry, South Africa 3
WEIRD STUFF – Learning a new computer language 4
NEWS **4**
NATURE BRIEFING – The Hunt for the World's Oldest Story 4
NATURE BRIEFING – We will know them by their trail of gum 4
NEWS FROM SCIENCE – Ancient chewing gum could reveal how early people split up their chores 4
NEWS FROM SCIENCE – Did lead poisoning doom Neanderthals? 4
NEWS FROM SCIENCE – An ancient cousin to humans probably built tools with its huge hands 4
SCIENCEADVISER – Ancient gum gives a glimpse of Stone Age society 4
SCIENCEADVISER – My, what big hands you have 5
SCIENCENEWS – Fossil hand bones point to tool use outside the Homo lineage 5
THE CONVERSATION – How a 400ky elephant skeleton solved a puzzle of early human behaviour 5
PUBLICATIONS **5**
American Journal of Biological Anthropology 5
PAPERS **5**
PREDRAG RADOVIĆ et al with MIRJANA ROKSANDIC – New Middle Pleistocene Hominin Dental Remains From Velika Balanica, Serbia 5
American Journal of Human Genetics 5
PAPERS **5**
LUDOVICA PICCHETTA et al – Maternal age and genome-wide failure of meiotic recombination are associated with triploid conceptions in humans 5
eLife 6
PAPERS **6**
JAMES FODOR, CARSTEN MURAWSKI & SHINSUKE SUZUKI – When word order matters: human brains represent sentence meaning differently from large language models 6
Evolutionary Human Sciences 6
PAPERS **6**
ARSHAM NEJAD KOURKI – Major Transitions in Sociocultural Evolution 6
Frontiers in Ecology and Evolution 6
PAPERS **6**
LAURENT PALLAS et al – New femoral evidence from the Afar reveal the early evolution of habitual squatting behaviors in the genus Theropithecus 6
Frontiers in Psychology 7
PAPERS **7**
QUANG NHAT NGUYEN & DUNG THI HUE DOAN – Beyond comprehensible input: a neuro-ecological critique of Krashen's hypothesis in language education 7
iScience 7
PAPERS **7**
ELIE RASSI et al – Beta-band frequency shifts signal decisions in human prefrontal cortex 7
Journal of the Royal Society Interface 7
PAPERS **7**
STEPHEN MAREN – The Beckman legacy and the future of interdisciplinary research 7
Mind & Language 7
PAPERS **7**
ALFREDO VERNAZZANI – Language comprehension and the rhythm of perception 7

Nature 7
ARTICLES 7
TRACY L. KIVELL & SAMAR M. SYEDA – First known fossil hand of the hominin Paranthropus boisei 7
PAPERS 8
CARRIE S. MONGLE et al with MEAVE G. LEAKEY – New fossils reveal the hand of Paranthropus boisei 8
Nature Communications 8
PAPERS 8
JUAN LUIS ROMERO-SOSA et al – Neural coding of choice and outcome are modulated by uncertainty in orbitofrontal but not secondary motor cortex 8
Nature Communications Biology 8
PAPERS 8
THOMAS C. PRANG et al – Ardipithecus ramidus ankle provides evidence for African ape-like vertical climbing in the earliest hominins 8
Nature Communications Earth & Environment 8
PAPERS 8
ALEX BERTACCHI et al – Biogeochemical evidence for targeted landscape use in ancient foragers of Malawi 8
Nature Ecology & Evolution 9
PAPERS 9
IGNACIO QUINTERO et al – Loss of macroevolutionary species fitness explains the rise and fall of clades 9
Nature Humanities & Social Sciences Communications 9
PAPERS 9
MATTHIAS URBAN – How oral traditions develop: a cautionary tale on cultural evolution from the Quechuan-speaking Andes 9
Nature Scientific Reports 9
PAPERS 9
HAERIN CHUNG et al – Experience shapes functional connectivity during action observation in the first year of life 9
IULIA BĂDESCU et al with FELIX RIEDE – Atypical tool and object use in wild immature chimpanzees reveals developmental pathways to innovation 10
New Scientist 10
ARTICLES 10
MICHAEL MARSHALL – Who were the first humans to reach the British Isles? 10
CHRISTA LESTÉ-LASSERRE – Evolution of intelligence in our ancestors may have come at a cost 10
PLoS Biology 10
PAPERS 10
YUVAL B. SIMONS et al – Simple scaling laws control the genetic architectures of human complex traits 10
PNAS 10
PAPERS 10
LINDELL BROMHAM et al – Macroevolutionary analysis of polysynthesis shows that language complexity is more likely to evolve in small, isolated populations 10
COMMENTARIES 11
ALEXANDER KOPLENIG & SASCHA WOLFER – Statistical errors undermine claims about the evolution of polysynthetic languages 11
XIA HUA & LINDELL BROMHAM – Reply to Koplenig and Wolfer: Global language analyses must account for relationships, location, and unbalanced binary data 11
Proceedings of the Royal Society B 11
PAPERS 11
SASKIA JOHNEN & ECKART ZIMMERMANN – Regression to the mean explains perception of action consequences 11
ANNA E. WHITE et al – Ancient DNA and biomarkers from artefacts: insights into technology and cultural practices in Neolithic Europe 11
Royal Society Open Science 11
PAPERS 11
ELEANE JAO et al – Thermal imaging demonstrates physiological responses to grooming interactions and audience effects in wild baboons 11
Science 12
NEWS 12
Did lead poisoning doom Neanderthals? 12
Science Advances 12
PAPERS 12
RENAUD JOANNES-BOYAU et mul – Impact of intermittent lead exposure on hominid brain evolution 12
HAECHAN GILL et al with JOHANNES KRAUSE – Ancient genomes from eastern Kazakhstan reveal dynamic genetic legacy of Inner Eurasian hunter-gatherers 12
Trends in Cognitive Sciences 12
PAPERS 12
JÖRG GROSS, CAROLINE GRAF & CHARLOTTE S.L. ROSSETTI – The hidden costs of human cooperation 12

SVEN L. MATTYS et al – Reconceptualizing cognitive listening 13
SUBSCRIBE to the EAORC Bulletin 13
UNSUBSCRIBE from the EAORC Bulletin 13
PRODUCED BY AND FOR THE EAORC EMAIL GROUP.....13

NOTICES

FORMATTED VERSION OF THIS BULLETIN

A pdf formatted version of this Bulletin is available for download at martinedwardes.me.uk/eaorc/eaorc_bulletins.htm.

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.

EDITORIAL INTERJECTIONS

Comments in curly brackets are editorial interjections. The Editor reserves the right to be wrong, and doesn't object to being called out on it.

ACADEMIA.EDU – The evolution of hominin skeletal muscle

Comparative Biochemistry and Physiology Part A 281, 111415 (2023).

SAMANTHA R. QUEENO et al – Human and African ape myosin heavy chain content and the evolution of hominin skeletal muscle

Humans are unique among terrestrial mammals in our manner of walking and running, reflecting 7 to 8 Ma of musculoskeletal evolution since diverging with the genus Pan. One component of this is a shift in our skeletal muscle biology towards a predominance of myosin heavy chain (MyHC) I isoforms (i.e. slow fibers) across our pelvis and lower limbs, which distinguishes us from chimpanzees. Here, new MyHC data from 35 pelvis and hind limb muscles of a Western gorilla (Gorilla gorilla) are presented. These data are combined with a similar chimpanzee dataset to assess the MyHC I content of humans in comparison to African apes (chimpanzees and gorillas) and other terrestrial mammals. The responsiveness of human skeletal muscle to behavioral interventions is also compared to the human-African ape differential. Humans are distinct from African apes and among a small group of terrestrial mammals whose pelvis and lower limb muscle is slow fiber dominant, on average. Behavioral interventions, including immobilization, bed rest, spaceflight and exercise, can induce modest decreases and increases in human MyHC I content (i.e. -9.3% to 2.3%, n = 2033 subjects), but these shifts are much smaller than the mean human-African ape differential (i.e. 31%). Taken together, these results indicate muscle fiber content is likely an evolvable trait under selection in the hominin lineage. As such, we highlight potential targets of selection in the genome (e.g. regions that regulate MyHC content) that may play an important role in hominin skeletal muscle evolution.
https://www.academia.edu/144497860/Human_and_African_ape_myosin_heavy_chain_content_and_the_evolution_of_hominin_skeletal_muscle

ACADEMIA.EDU – ~2-million-year-old hominin pelvis (DNH 43) from Drimolen Main Quarry

South African Journal of Science 121:3/4 (2025).

ELLIE BERG et al – Further assessment of a ~2-million-year-old hominin pelvis (DNH 43) from Drimolen Main Quarry, South Africa

The palaeocave site of Drimolen Main Quarry (DMQ) in Gauteng Province, South Africa, has produced fossil hominin material dating to 2.04–1.95 Ma, including craniodental remains attributed to Paranthropus robustus and the earliest specimen of Homo erectus sensu lato along with numerous postcrania of uncertain taxonomic affiliation. Among this collection is a partial pelvis (DNH 43), which includes the sacrum and elements of the right os coxae. Although previously described as showing similarities to the pelvis of Australopithecus and Paranthropus, comparisons across the broader hominin fossil record have been limited and DNH 43 has never been analysed quantitatively. Here we present a partial digital reconstruction of DNH 43 and compare it to an expanded data set of fossil specimens to determine its closest morphological affinities. Overall, the quantitative analysis is congruent with qualitative results reflecting the primitive features of DNH 43, suggesting an Australopithecus/Paranthropus-like anatomy, including small absolute size, relatively small sacroiliac articulation, moderately wide tuberoacetabular sulcus, gracile acetabulosacral buttress, and obstetric dimensions that are relatively broad. A study of this rare articulated pelvis shows that the orientation of the sacrum (pelvic incidence) is similar to that of recent Homo sapiens. Although DNH 43 shares some specific metric similarities with specimens MH2 (Australopithecus sediba) and OH 28 (cf. Homo erectus), the taxonomic relevance is unclear given the poor understanding of Paranthropus and early Homo

postcranial variation. Affiliation with Paranthropus robustus (which dominates the DMQ craniodental assemblage) cannot be ruled out, and we consider assignment to that taxon to be a reasonable provisional attribution.
https://www.academia.edu/144497885/Further_assessment_of_a_2_million_year_old_hominin_pelvis_DNH_43_from_Drimolen_Main_Quarry_South_Africa

WEIRD STUFF – Learning a new computer language

For those who don't know, I was a computer consultant before I joined academia. However, knowledge of FORTRAN, COBOL, BASIC, C++, etc. is no longer relevant to modern computing, so I thought I would try one of the newer computer languages: I've decided to learn Python.
Things are going well. I've already mastered the Lumberjack Song, The Dead Parrot sketch (both parts), the Fish-Slapping Dance and, the Grail of all things Python, the Holy Hand Grenade of Antioch prayer. However, I keep feeling I'm missing something important.

NEWS

NATURE BRIEFING – The Hunt for the World's Oldest Story

From thunder gods to serpent slayers, scholars are reconstructing myths that vanished millennia ago. How much further can we go—and what might we find?
https://www.newyorker.com/magazine/2025/10/20/review-the-roots-of-ancient-mythology-books

NATURE BRIEFING – We will know them by their trail of gum

Ancient DNA pulled from chewed-up wads of birch-bark tar reveals more about the lives of the people who munched it. The material was used as an all-purpose adhesive, and many of the blobs we've found have tooth marks. Thirty samples from Mesolithic and early Neolithic sites in what is now Scandinavia were analysed for DNA, revealing traces of human oral microbes and the remnants of plants and animals such as wheat and wild boar. Several pieces contained human DNA that was recognizably male or female — with the male-chewed tar used to haft stone tools and the female-chewed tar used to repair pottery, possibly indicating which crafts tended to be done by whom.
https://royalsocietypublishing.org/doi/10.1098/rspb.2025.0092

NEWS FROM SCIENCE – Ancient chewing gum could reveal how early people split up their chores

Birch bark tar, used as chewing gum and glue, provides rare window into life 6000 years ago
https://www.science.org/content/article/ancient-chewing-gum-could-reveal-how-early-men-and-women-split-their-chores

NEWS FROM SCIENCE – Did lead poisoning doom Neanderthals?

Modern humans' tolerance for the toxic metal may have helped them outcompete our closest evolutionary cousins.
https://www.science.org/content/article/did-lead-poisoning-doom-neanderthals

NEWS FROM SCIENCE – An ancient cousin to humans probably built tools with its huge hands

New fossils reveal Paranthropus had massive yet dexterous hands.
https://www.science.org/content/article/ancient-cousin-humans-probably-built-tools-its-huge-hands

SCIENCEADVISER – Ancient gum gives a glimpse of Stone Age society

Long before duct tape or bubble gum, Stone Age farmers had all-purpose birch bark tar. Around 6000 years ago, they used it to superglue broken pottery, haft stone blades, and even as chewing gum. For the first time, researchers have now recovered DNA and other clues from spat-out lumps of the stuff and the tools and pottery they patched. The findings could reveal new insights into what prehistoric Europeans ate, their oral health, and even how they divvied up their chores.
Researchers examined 30 tar samples from nine sites, mostly lakeside settlements around the Alps. Although bones and teeth rarely survive in such wet environments, the waterlogged conditions were ideal for preserving organic material such as tar. Chewed pieces contained both male and female DNA. Some even appeared to have been chewed by multiple people. Interestingly, all four tar pieces used to haft stone tools carried male DNA, whereas all three of the tars used to repair pottery contained female DNA.
This discovery hints that birch tar could help researchers explore a question usually invisible in the archaeological record: how people divided work in prehistoric communities. The sample size is too small to confirm a gender divide between toolmaking and pottery repair just yet, but future work could explore this question further.
The chewed lumps also preserved traces of ancient saliva and mouth microbes. Notably, these microbes more closely resembled modern oral microbiomes than those found in dental calculus, suggesting birch tar may capture a different, previously unknown snapshot of oral health.
https://www.science.org/content/article/ancient-chewing-gum-could-reveal-how-early-men-and-women-split-their-chores

SCIENCEADVISER – My, what big hands you have

Scientists have debated whether P. boisei made stone tools ever since 1959 when the famous Leakey family found the first skull of the species at Tanzania's Olduvai gorge alongside a trove of tools. At the time, paleoanthropologist Mary Leakey concluded they had probably been made by another hominin, Homo habilis ("handy man" in Latin). But the newly described hand—excavated in 2019 in part by Mary's granddaughter, Louise Leakey—suggests P. boisei was just as handy.
Despite its large size and thick fingers, it possessed a comparatively long thumb and featured flat fingertips. Both traits are essential to a precision grip found in known toolmakers. The stocky hominin may have used its stocky build to strip tough, fibrous plants while still being nimble enough to precisely knap stones and turn them into sharp cutters and diggers. "It would have had a very firm handshake," said Leakey.
https://www.science.org/content/article/ancient-cousin-humans-probably-built-tools-its-huge-hands

SCIENCENEWS – Fossil hand bones point to tool use outside the Homo lineage

Paranthropus boisei may have used simple stone tools around 1.5 million years ago.
https://www.sciencenews.org/article/fossil-hand-bones-tool-use

THE CONVERSATION – How a 400ky elephant skeleton solved a puzzle of early human behaviour

Early nomadic humans living in Europe briefly halted to profit from an unexpected windfall, leaving some important clues about their behaviour.
https://theconversation.com/how-a-400-000-year-old-elephant-skeleton-solved-a-tantalising-puzzle-of-early-human-behaviour-267137

PUBLICATIONS

American Journal of Biological Anthropology

PAPERS

PREDRAG RADOVIĆ et al with MIRJANA ROKSANDIC – New Middle Pleistocene Hominin Dental Remains From Velika Balanica, Serbia

The cave site of Velika Balanica in Sićevo Gorge, Serbia, has previously yielded early Neanderthal dental remains from Layer 3a, dated by thermoluminescence to 285 ± 34 and 295 ± 74 ka. We describe and compare four additional dental specimens recovered from the Middle Pleistocene Layers 3a and 3b of the cave: a right I1 (BH-8), a right I2 (BH-7), an incisor crown fragment (BH-16), and a left M3 (BH-15).
The fossil teeth were scanned using micro-computed tomography (µCT), and the resulting digital models were used to record dimensions and assess internal morphology, including the enamel–dentine junction (EDJ). Morphological traits were analyzed on both outer and internal surfaces. Dental measurements were compared to those of relevant hominin samples.
BH-8 and BH-7 show large, robust crowns and roots, consistent with Pleistocene Eurasian hominins. Linear enamel hypoplasia is present in BH-8 and BH-16. BH-15 displays a continuous middle trigonid crest—a trait considered diagnostic of the Neanderthal lineage. Notably, BH-15 also presents an extreme case of taurodontism, as well as a severe antemortem tooth fracture accompanied by multiple pulp stones, which are rarely recorded in the hominin fossil record.
These findings align with earlier results, reinforcing evidence for early Neanderthal presence at Velika Balanica around 300 ka. While Neanderthals may have been present in the region earlier, this represents the earliest dated evidence of their spread into the Balkans.
https://onlinelibrary.wiley.com/doi/full/10.1002/ajpa.70133

American Journal of Human Genetics

PAPERS

LUDOVICA PICCHETTA et al – Maternal age and genome-wide failure of meiotic recombination are associated with triploid conceptions in humans

Triploid and haploid conceptions are not viable and are a common occurrence in humans, where they account for 10% of all pregnancy losses. Despite the parent of origin being important in the etiology of the pregnancy, our knowledge of their causes is limited, especially at the point of conception. Using a dataset of 96,660 biopsies and a validation dataset of 44,324 from human blastocyst embryos generated by intracytoplasmic sperm injection, we estimate that 1.1% of human conceptions (n = 1,063) contain extra or missing chromosome sets in zygotes. In our cohort of intracytoplasmic-sperm-injection-derived embryos, where the risk of polyspermy is inherently lower compared to natural conception, we identify for the first time a maternal age effect, with a 1.046-per-year increased risk in triploidy/haploidy ($p < 0.001$). In 0.03% of couples, we identified three or more triploid/haploid embryos, suggesting a personal risk effect ($p = 0.03$). Genotype analysis of 41 triploid embryo biopsies and their parents shows that around one-third of maternal triploid conceptions originate in meiosis I and two-thirds in meiosis II. Seven of these embryos are inferred to have entirely failed to initiate meiotic recombination genome wide, a surprising finding suggesting that human oocytes with pervasive meiotic recombination failure that are

formed during fetal development are capable of ovulation in adult life. Finally, we identify a type of genome-wide maternal isodiploidy (two maternal chromosome sets) in 0.05% of embryos (41/74,009). Collectively, our findings shed light on the biology of meiosis and the formation of human oocytes with the number of chromosome sets.
https://www.cell.com/ajhg/fulltext/S0002-9297(25)00390-8

eLife

PAPERS

JAMES FODOR, CARSTEN MURAWSKI & SHINSUKE SUZUKI – When word order matters: human brains represent sentence meaning differently from large language models

Reviewed Preprint v1

Large language models based on the transformer architecture are now capable of producing human-like language. But do they encode and process linguistic meaning in a human-like way? Here, we address this question by analysing 7T fMRI data from 30 participants reading 108 sentences each. These sentences are carefully designed to disentangle sentence structure from word meaning, thereby testing whether transformers are able to represent aspects of sentence meaning above the word level. We found that while transformer models match brain representations better than models that completely ignore word order, all transformer models performed poorly overall. Further, transformers were significantly inferior to models explicitly designed to encode the structural relations between words. Our results provide insight into the nature of sentence representation in the brain, highlighting the critical role of sentence structure. They also cast doubt on the claim that transformers represent sentence meaning similarly to the human brain.
https://elifesciences.org/reviewed-preprints/108442

Evolutionary Human Sciences

PAPERS

ARSHAM NEJAD KOURKI – Major Transitions in Sociocultural Evolution

Recent years have seen growing interest in applying the Evolutionary Transitions in Individuality (ETI) framework to human sociocultural evolution. Proponents argue that human societies exhibit features—such as multilevel organisation, cooperation, and division of labour—sufficiently analogous to biological ETIs to warrant theoretical extension. This paper critically assesses such claims and argues that they rest on a fundamental misapplication of the ETI framework. Drawing on recent work in cultural evolution, I show that sociocultural systems typically lack the core conditions required for an ETI, including autonomous reproduction at the group level and the operation of natural selection in the reproductive mode. Attempts to relax these criteria risk undermining the coherence of the framework itself. I conclude that while the broader MET framework may still have value for understanding sociocultural change, the specific explanatory structure of ETI theory does not transfer.
https://www.cambridge.org/core/journals/evolutionary-human-sciences/article/major-transitions-in-sociocultural-evolution/4DE4122D59CD4B34D35D5EE2527ADC84

Frontiers in Ecology and Evolution

PAPERS

LAURENT PALLAS et al – New femoral evidence from the Afar reveal the early evolution of habitual squatting behaviors in the genus Theropithecus

The femoral anatomy of fossil Theropithecus is poorly known, although it provides critical data for inferring squatting behaviors, a characteristic trait of extant Theropithecus gelada.
Here, we describe and provide functional and taxonomic interpretations on two subcomplete femora from the Afar Depression using a combination of traditional morphometrics (bivariate and multivariate) and 2D geometric morphometric combined with multivariate analyses and hierarchical clustering.
The ca. 3.20 Ma A.L. 206–1 femur is identified as the oldest known and most complete femur of an adult Theropithecus cf. oswaldi darti and shows a morphology similar to that of extant T. gelada. It supports the hypothesis of an early emergence of squatting behaviors in Theropithecus, prior to the onset of dental adaptations related to the grazing diet of the genus. The ca. 2.60 Ma A.L. 94–5 femur is identified as the oldest and most complete femur known of an adult Theropithecus cf. oswaldi oswaldi. Its knee anatomy is distinct from that of T. o. darti but it nonetheless shares with T. gelada and other fossil Theropithecus functional traits related to squatting behaviors. Unexpected convergences with arboreal cercopithecids are observed in Theropithecus brumpti, indicating diversity in the femoral functional anatomy of Theropithecus.
Overall, our study highlights the future need to link femoral anatomical diversity with postural and locomotor behaviors by combining paleontological data with neontological data including biomechanical data on the squatting and climbing of large extant papionins.
https://www.frontiersin.org/journals/ecology-and-evolution/articles/10.3389/fevo.2025.1593646/full

Frontiers in Psychology

PAPERS

QUANG NHAT NGUYEN & DUNG THI HUE DOAN – Beyond comprehensible input: a neuro-ecological critique of Krashen's hypothesis in language education

This article critically reassesses the Comprehensible Input (CI) hypothesis in language education by drawing on recent advances in neurolinguistics and an ecological perspective on learning. While the CI hypothesis claims that language is acquired by understanding input slightly beyond a learner's current competence (i+1), converging evidence from brain research shows that language development is an active and embodied process supported by interaction, feedback, and multimodal engagement. From the ecological point of view, affordances are the perceivable opportunities for action that arise in the ongoing coupling of learner and environment. Using this combined neuro-ecological lens, the paper critically reviews empirical studies from the last three decades and demonstrates that meaningful language growth depends on learners detecting and acting on such affordances rather than merely processing linear and simplified input. Adaptive and AI-supported learning systems further illustrate how contemporary technologies can operate these mechanisms and offer individualized, scalable alternatives to the static i+1 model. The analysis argues that CI should no longer serve as a central doctrine in language education and calls for pedagogies that reflect the interactive, affordance-rich processes revealed by current brain and language science.

https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2025.1636777/full

iScience

PAPERS

ELIE RASSI et al – Beta-band frequency shifts signal decisions in human prefrontal cortex

Beta-band synchronization has been found to be content-specific, particularly during decision-making. Recently, we showed a beta-band frequency shift in macaque prefrontal cortex to reflect categorical decision outcomes in a temporal categorization task. Here, we sought to replicate these findings in human participants, and additionally asked whether these beta frequency shift dynamics generalize to other task contexts and modalities. Across three EEG and MEG experiments (n=82; 42 female and 40 male) that required participants to make a perceptual decision, we found that a beta-band frequency shift in the prefrontal cortex signaled the decision outcome. This finding was consistent across a temporal categorization task, a delayed match-to-sample task, and a cross-modal discrimination task. We conclude that this signal is a robust marker of perceptual decisions.

https://www.cell.com/iscience/fulltext/S2589-0042(25)02067-X

Journal of the Royal Society Interface

PAPERS

STEPHEN MAREN – The Beckman legacy and the future of interdisciplinary research

The Beckman Institute for Advanced Science of Technology at the University of Illinois Urbana-Champaign was established in 1989 with the generous support of the Arnold and Mabel Beckman Foundation. It was built to break through disciplinary boundaries and produce scientific discoveries that could only be made by teams using interdisciplinary approaches. After 36 years, I reflect on the transformative legacy of the Beckman Institute at Illinois and how it informs my perspective on future of interdisciplinary research.

https://royalsocietypublishing.org/doi/10.1098/rsif.2025.0462

Mind & Language

PAPERS

ALFREDO VERNAZZANI – Language comprehension and the rhythm of perception

It is widely agreed that language understanding has a distinctive phenomenology, as illustrated by phenomenal contrast cases. Yet it remains unclear how to account for the perceptual phenomenology of language experience. I advance a rhythmic account, which explains this phenomenology in terms of changes in the rhythm of sensory capacities in both reading and speech perception. After presenting conceptual and empirical foundations for the account, I argue that it should be abductively preferred over competing views, especially the semantic perceptual view, which holds that we literally perceive linguistic meaning.

https://onlinelibrary.wiley.com/doi/full/10.1111/mila.70003

Nature

ARTICLES

TRACY L. KIVELL & SAMAR M. SYEDA – First known fossil hand of the hominin Paranthropus boisei

Hand bones from a human relative, found in Kenya, reveal features similar to those of living gorillas, complicating the evolutionary history of hand and tool manipulation.

https://www.nature.com/articles/d41586-025-03129-x

PAPERS

CARRIE S. MONGLE et al with MEAVE G. LEAKEY – New fossils reveal the hand of Paranthropus boisei

When Mary Leakey discovered the OH 5 cranium of Paranthropus boisei alongside Oldowan stone artefacts, it was declared "the oldest yet discovered maker of stone tools". Whether Paranthropus made and used tools has been debated ever since, largely because there are no known hand bones that can be definitively attributed to this genus. Here we report fossil hand and foot bones unambiguously associated with craniodental material of P. boisei. KNM-ER 101000 demonstrates that P. boisei shared key manipulative and bipedal adaptations with the genus Homo. Moreover, the hand morphology of KNM-ER 101000 converges on that of gorillas in ways that are consistent with manual food processing and would have facilitated powerful grasping, such as that used in climbing. These fossils suggest that P. boisei was capable of tool making and use in some capacity while also supporting the proposed dichotomy of distinct dietary adaptations between Paranthropus and Homo. In addition to offering insights into the poorly known postcranial functional anatomy of Paranthropus, this discovery illuminates broader patterns of hominin hand evolution and tool use.
https://www.nature.com/articles/s41586-025-09594-8

Nature Communications

PAPERS

JUAN LUIS ROMERO-SOSA et al – Neural coding of choice and outcome are modulated by uncertainty in orbitofrontal but not secondary motor cortex

Orbitofrontal cortex (OFC) and secondary motor cortex (M2) are both implicated in flexible reward learning but the conditions that differentially recruit these regions are not fully understood. We imaged calcium activity from single neurons in rat OFC or M2 during de novo learning of increasingly uncertain reward probability schedules. Predictions of choice were decoded from M2 neurons with high accuracy under all certainty conditions, but were more accurately decoded from OFC neurons under greater uncertainty. Decoding accuracy of choice and outcome was predicted by behavioral strategies Win-Stay and Lose-Shift in OFC, but not M2. Whereas chemogenetic inhibition of OFC neurons attenuated learning across all schedules, M2 neurons were found to support learning in only the most certain reward schedule. Thus, OFC neurons preferentially encode choices and outcomes that foster a greater reliance on adaptive strategies under uncertainty. This reveals a functional heterogeneity within frontal cortex in support of flexible learning.
https://www.nature.com/articles/s41467-025-63866-5

Nature Communications Biology

PAPERS

THOMAS C. PRANG et al – Ardipithecus ramidus ankle provides evidence for African ape-like vertical climbing in the earliest hominins

The origin of the human lineage was catalyzed by bipedalism, but how this locomotor mode evolved is debated. We investigated the evolutionary context of human bipedalism by analyzing the morphology of the 4.4 million-year-old hominin talus attributed to Ardipithecus ramidus (ARA-VP-6/500-023). Our results demonstrate that ARA-VP-6/500-023 bears similarities to the tali of chimpanzees and gorillas, who are adapted to vertical climbing and terrestrial plantigrade quadrupedalism. Additionally, we identify the presence of derived features in ARA-VP-6/500-023 consistent with previous suggestions of an enhanced push-off mechanism in the foot of Ar. ramidus. Our observations of the human and ape fossil record are inconsistent with recently proposed models of human origins, which envision the last common ancestor of humans and chimpanzees as a generalized arboreal ape. Instead, our results strongly imply that humans evolved from an African ape-like ancestor, which directly narrows the range of explanations for the origin of our lineage.
https://www.nature.com/articles/s42003-025-08711-7

Nature Communications Earth & Environment

PAPERS

ALEX BERTACCHI et al – Biogeochemical evidence for targeted landscape use in ancient foragers of Malawi

The Zambezian Biome of southern-central Africa was an important environmental setting for ancient human interactions and biogeographic dispersals. Here, we assess herbivore migratory behavior and habitat selection with a ~ 2,500 km2 isoscape of bioavailable strontium (87Sr/86Sr) for the Kasitu Valley of northern Malawi, and a probabilistic spatial assignment of fossil herbivore enamel from four sites dated to the last 25,000 calibrated years BP. The results show a very large range in bioavailable 87Sr/86Sr values in the study area (0.7248-0.8521) and reveal that foragers hunted small game locally and procured most large prey in the Afromontane grasslands to the southeast of the study area and along narrow riparian corridors. We found no evidence of migratory behavior in species that exhibit this behavior today. Ancient foragers likely hunted prey that were available year-round, consistent with zooarchaeological and genetic evidence for reduced mobility at the end of the Pleistocene.
https://www.nature.com/articles/s43247-025-02795-z

Nature Ecology & Evolution

PAPERS

IGNACIO QUINTERO et al – Loss of macroevolutionary species fitness explains the rise and fall of clades

How and why species diversity varies over geological timescales remains disputed. Debate revolves around the existence of equilibrium dynamics, the predominance of adaptive radiations and the relative importance of speciation and extinction in driving diversity trajectories. We analyse the evolutionary history of 27 radiations of plants, arthropods and vertebrates, with phylogenetic information incorporating extinct and extant species under a new 'fossilized birth–death diffusion' model that provides a detailed characterization of past diversification and resulting diversity dynamics. Here, lineages undergo speciation and extinction rates that diffuse continuously in time and generate fossils with rates that can vary with stratigraphy. Clade diversity trajectories follow rise and decline dynamics, with fast accumulation following recurrent speciation while slowdowns and losses are modulated primarily by changes in extinction. Diversity dynamics do not appear to be governed by clade-level processes expected from adaptive radiations or diversity dependence. Rather, these patterns emerge from dynamics at the species level, where lineages tend to become increasingly vulnerable to extinction and less likely to speciate with time. Those species that counteract this trend create and maintain biodiversity through deep time. The rise and fall of clades results from species-level fates.
https://www.nature.com/articles/s41559-025-02873-7

Nature Humanities & Social Sciences Communications

PAPERS

MATTHIAS URBAN – How oral traditions develop: a cautionary tale on cultural evolution from the Quechuan-speaking Andes

While large-scale comparative and historical analysis of folktales has largely disappeared from anthropological inquiry after the wane of diffusionism in the early 20th century, such approaches are experiencing a revival in the framework of cultural evolution. In that context, questions asked include to what extent narrative traditions are transmitted horizontally from generation to generation; influenced by practices of neighbors; and form larger packages with other expressions of culture, prominently language. Here, I explore to what extent 41 versions of a widespread story told by Indigenous Andean storytellers in the Quechuan languages show signs of having developed according to evolutionary phylogenetic mechanisms, bringing data from the underrepresented New World into the purview of the literature. The story of Juan Oso ("John the Bear"), which tells of the origins and adventures of a half-bear, half-human boy, has European roots, meaning that variation in the Central Andes only had several centuries to develop. Analyses show that the story varies in ways that can neither be explained fully by where it is told (and hence by possible "diffusion" of characteristics from region to region), nor by the Quechuan variety in which it is told ("co-evolution of language and culture"), nor, most importantly, by historical mechanisms of an evolutionary nature according to which the story might change. With reference to the ethnographic literature, I suggest that these results can be explained by the ways in which Andean storytellers recombine narrative material from stories to imbue them with new meaning that comments on local and regional social and political circumstances, and that a "rhizotic" model of development, in addition to or instead of the phylogenetic ones tested by cultural evolutionists, might be more adequate to understand how the individual versions of this story came to be told the way they are.
https://www.nature.com/articles/s41599-025-05335-4

Nature Scientific Reports

PAPERS

HAERIN CHUNG et al – Experience shapes functional connectivity during action observation in the first year of life

Infants' action perception is connected to and affected by their own action experience. While the association between production and perception of action is robustly found in behavioral studies, less is known about the underlying neural mechanisms that are involved in this link. Recent findings suggest that infants exhibit heightened motor-visual connectivity when observing familiar actions, which scales with their level of action competence. However, it is still an open question whether experience and acquisition of a new action modulate motor visual connectivity. The period between 10-to-12 months is a transitional stage where infants become proficient in grasping while just beginning to develop the ability to point. In the current study, we asked whether 10-to-12 months infants exhibit motor-visual connectivity during observation of grasping and pointing actions, and whether motor-visual connectivity during pointing varies with exposure to an intervention that supports the development of pointing. We re-analyzed data including EEG recordings from 10-to-12-month-old infants during an action perception task, along with measures of their prior experience pointing and participation in a pointing intervention. We replicated previous findings of heightened motor-visual connectivity during the observation of others' grasping actions, but did not observe differences during the observation of pointing actions. Notably, we found preliminary evidence of an increase in frontal-motor-visual connectivity across the infant brain during the observation of pointing after a pointing intervention. Together, these findings suggest that different stages of action competence may be associated with distinct changes in the neural mechanisms underlying action perception, which are modulated by experience.
https://www.nature.com/articles/s41598-025-20171-x

IULIA BĂDESCU et al with FELIX RIEDE – Atypical tool and object use in wild immature chimpanzees reveals developmental pathways to innovation

Innovation drives cultural evolution, yet little is known about its developmental origins or the role of immature individuals in generating novel behaviors. We examined 67 object uses by 36 infant and juvenile chimpanzees (Pan troglodytes schweinfurthii), over 15 months at Ngogo, Uganda. Nearly half of object uses were atypical, deviating from adult norms. 94% of atypical bouts were novel additions or modifications of adult forms or uses in new contexts, including three efficacious innovations: doll play, moss-sponging, and leaf-clipping to request carrying. To assess individual differences, we developed an Exploration Index integrating frequency, diversity, and atypicality of object use. Nine individuals had notably higher scores. Females and offspring of multiparous mothers scored higher, indicating effects of sex and possible social scaffolding from experienced mothers and siblings on object use. These findings suggest that immatures generate novelty at the margins of species-typical behavior yet vary in their propensity to innovate. A permissive social environment for object play may be key to the developmental pathways of innovation, providing a generative context for behavioral variation on which social learning and selection can act. If retained and transmitted, even rare innovations by immatures could contribute to the accumulation of cultural complexity.
https://www.nature.com/articles/s41598-025-20487-8

New Scientist

ARTICLES

MICHAEL MARSHALL – Who were the first humans to reach the British Isles?

As ancient humans left Africa, they encountered many harsh environments including the Sahara and the high Arctic, but one of the last places they inhabited was Britain, likely due to the relentless cold and damp climate.
https://www.newscientist.com/article/2499788-who-were-the-first-humans-to-reach-the-british-isles/

CHRISTA LESTÉ-LASSERRE – Evolution of intelligence in our ancestors may have come at a cost

By tracing when variations in the human genome first appeared, researchers have found that advances in cognitive abilities may have led to our vulnerability to mental illness
https://www.newscientist.com/article/2499487-evolution-of-intelligence-in-our-ancestors-may-have-come-at-a-cost/

PLoS Biology

PAPERS

YUVAL B. SIMONS et al – Simple scaling laws control the genetic architectures of human complex traits

Genome-wide association studies have revealed that the genetic architectures of complex traits vary widely, including in terms of the numbers, effect sizes, and allele frequencies of significant hits. However, at present we lack a principled way of understanding the similarities and differences among traits. Here, we describe a probabilistic model that combines the effects of mutation, drift, and stabilizing selection at individual sites with a genome-scale model of phenotypic variation. In this model, the architecture of a trait arises from the distribution of selection coefficients of mutations and from two scaling parameters. We fit this model for 95 highly polygenic quantitative traits of different kinds from the UK Biobank. Notably, we infer that all these traits have fairly similar, though not identical, distributions of selection coefficients. This similarity suggests that differences in architectures of highly polygenic traits arise mainly from the two scaling parameters: the mutational target size and heritability per site, which vary by orders of magnitude among traits. When these two scale factors are accounted for, we find that the architectures of all 95 traits are very similar.
https://journals.plos.org/plosbiology/article?id=10.1371/journal.pbio.3003402

PNAS

PAPERS

LINDELL BROMHAM et al – Macroevolutionary analysis of polysynthesis shows that language complexity is more likely to evolve in small, isolated populations

Evolution of complexity in human languages has been vigorously debated, including the proposal that complexity can build in small, isolated populations but is often lost in situations of language contact. If it is generally true that small, isolated languages can build morphological complexity over time, but complexity tends to be lost in situations of language contact, then we should find that forms of language complexity that have evolved multiple times will tend to be associated with population size, isolation, and language age. We test this hypothesis by focusing on one particular form of morphological complexity, polysynthesis, where words built from many parts embody complex phrases. By assembling a global database of polysynthetic languages and conducting phylospatial analyses, we show that languages with highly complex word morphology are more likely to have small population sizes, less likely to occur with many other languages in direct contact, and have a greater tendency to be on long phylogenetically isolated lineages. These findings are consistent with the hypothesis that languages that evolve in isolation for long periods may be more likely to accrue morphological complexity. Polysynthetic languages also tend to have higher levels of endangerment. Our results provide phylogenetically informed

evidence that one particular form of complex language morphology is more likely to occur in small, isolated languages and is prone to loss in contact.
https://www.pnas.org/doi/10.1073/pnas.2504483122

COMMENTARIES

ALEXANDER KOPLENIG & SASCHA WOLFER – Statistical errors undermine claims about the evolution of polysynthetic languages
Bromham et al. claim that polysynthetic languages tend to have smaller populations, fewer neighbouring languages in contact, and greater phylogenetic isolation. We show that the statistical analysis behind these claims contains key flaws that undermine the robustness of the results.
https://www.pnas.org/doi/full/10.1073/pnas.2518416122

XIA HUA & LINDELL BROMHAM – Reply to Koplenig and Wolfer: Global language analyses must account for relationships, location, and unbalanced binary data
Koplenig and Wolfer (KW) fail to account for important features of language data: i) Typological data (e.g., grammatical features) are often binary, unbalanced (far fewer languages with feature than without), and unevenly distributed (clustered in languages and regions); ii) autocorrelation due to relationships and distance cannot be captured in family or regional-level analyses. We show that aspects of our analysis designed to deal with i) do not alter the conclusions, but failure to account for ii) explains KW's results.
https://www.pnas.org/doi/full/10.1073/pnas.2518837122

Proceedings of the Royal Society B

PAPERS

SASKIA JOHNEN & ECKART ZIMMERMANN – Regression to the mean explains perception of action consequences
Predictions shape the perceptual consequences of our own actions such that self-generated events appear less intense to us. However, recent studies also reported sensory enhancement of self-produced sounds. Here, we tested whether sensory attenuation and enhancement are signatures of an adaptation to the mean sound statistics. In 330 human participants, we tested the idea that predictions about upcoming sounds shift auditory processing to the average sound context. Participants produced sounds between 40 and 80 decibels (dB) and rated their loudness. Estimates of perceived loudness followed a regression to the mean sound level. The effect was similar for self-produced and passively observed but temporally predictable tones, suggesting predictability alone drives perceptual changes. We then artificially created a new mean sound level by presenting sessions in which subjects mostly (80% of trials) produced either loud (80 dB) or quiet (40 dB) tones. In loud contexts, rarely presented quiet tones were enhanced, and in quiet contexts, loud tones were attenuated. Our results challenge the dominant forward model explanation, which attributes sensory attenuation to predictive suppression of self-generated stimuli, and instead open the door for alternative explanations. Our findings point to regression towards the mean sound level as the most plausible account for predictable sounds.
https://royalsocietypublishing.org/doi/full/10.1098/rspb.2025.1715

ANNA E. WHITE et al – Ancient DNA and biomarkers from artefacts: insights into technology and cultural practices in Neolithic Europe
Birch bark tar was widely used throughout prehistoric Europe for hafting stone tools as well as various other purposes. While previous research has mainly focused on the identification and production of birch bark tar, its diverse uses remain to be fully explored. In this study, we combined ancient DNA with organic residue analysis to analyse 30 birch tar artefacts from nine Neolithic sites in and around the Alps. We identified birch tar as the main component, with some samples also containing conifer resin or tar, possibly added to modify its properties. Degradation markers indicate that tar used for ceramic repair was heated repeatedly, probably during cooking. Additionally, the presence of human and oral microbial DNA in some of the samples suggests the tar was chewed, in some cases by multiple individuals. The human DNA also enables us to determine the sex of those who chewed the tar, offering insights into gendered practices in the past, while plant and animal DNA shed light on past diets and the possible use of additives. This study underscores the value of integrating organic residue and ancient DNA analysis of archaeological artefacts to deepen our understanding of past cultural practices.
https://royalsocietypublishing.org/doi/full/10.1098/rspb.2025.0092

Royal Society Open Science

PAPERS

ELEANE JAO et al – Thermal imaging demonstrates physiological responses to grooming interactions and audience effects in wild baboons
Infrared thermography is an emerging non-invasive tool for monitoring physiological responses to stimuli, yet its application in wild settings has been limited. This study quantified variation in nasal temperatures via thermal imaging of wild chacma baboons (Papio ursinus) in Namibia. We aimed to determine whether social and solitary activities exhibit distinct

physiological responses and explore the potential of thermal imaging in wildlife behavioural studies. We collected 1626 thermal images of 105 individuals during the baboons' natural behaviours. Using linear mixed-effects models, we show that, compared with foraging and resting, nasal temperatures were elevated in baboons during grooming, which may indicate relaxation. Additionally, we find that the presence of more neighbours and higher ranking neighbours is associated with cooler nasal temperatures, suggesting an audience effect. These findings further demonstrate that infrared thermography can quantitatively link differences in observed behaviours to associated physiological states through fine thermal cues in unrestrained primates. Thermal biomarkers have the potential to inform social processes, welfare states, emotions and stress responses in wildlife behaviour studies.
https://royalsocietypublishing.org/doi/10.1098/rsos.251398

Science

NEWS

Did lead poisoning doom Neanderthals?
Modern humans' tolerance for the toxic metal may have helped them outcompete our closest evolutionary cousins.
https://www.science.org/content/article/did-lead-poisoning-doom-neanderthals

Science Advances

PAPERS

RENAUD JOANNES-BOYAU et mul – Impact of intermittent lead exposure on hominid brain evolution
Gene-environmental interactions shape the evolution of brain architecture and function. Neuro-oncological ventral antigen 1 (NOVA1) is one gene that distinguishes modern humans from extinct hominids. However, the evolutionary pressures that selected the modern NOVA1 allele remain elusive. Here, we show using fossil teeth that several hominids (Australopithecus africanus, Paranthropus robustus, early Homo sp., Gigantopithecus blacki, Pongo sp., Homo neanderthalensis, and Homo sapiens) were consistently exposed to lead over 2 million years, contradicting the idea that lead exposure is solely a modern phenomenon. Moreover, lead exposure on human brain organoids carrying the archaic NOVA1 variant disrupts FOXP2 expression in cortical and thalamic organoids, a gene crucial for the development of human speech and language abilities. Overall, the fossil, cellular, and molecular data support that lead exposure may have contributed to the impact of social and behavioral functioning during evolution, likely affording modern humans a survival advantage.
https://www.science.org/doi/10.1126/sciadv.adr1524

HAECHAN GILL et al with JOHANNES KRAUSE – Ancient genomes from eastern Kazakhstan reveal dynamic genetic legacy of Inner Eurasian hunter-gatherers
Because of limited availability of ancient genomes, the genetic history of prehistoric Inner Asian hunter-gatherers remains incomplete, especially for eastern Kazakhstan where the Eurasian Steppe meets mountain forests of Inner Asia. Here we report genome-wide data of two Early Neolithic (EN) hunter-gatherers and 19 Middle-Late Bronze Age (MLBA) pastoralists, from the site of Koken in the Upper Irtysh River region in eastern Kazakhstan. We find that the two EN individuals differed in their genetic profiles and yet were second-degree relatives. They were genetically most similar to subsequent Neolithic individuals in the Irtysh region, while contemporaneous hunter-gatherers from the Tobol-Ishim and Upper Ob River regions had distinct genetic profiles, likely influenced by riverine geography. The Koken MLBA individuals were genetically similar to other MLBA steppe pastoralists, while genetic outliers provide evidence of two distinct trajectories of admixture with local hunter-gatherer populations. These findings illuminate the dynamic population structure of Inner Asian hunter-gatherers and their genetic legacy in subsequent pastoralist populations.
https://www.science.org/doi/10.1126/sciadv.adw8219

Trends in Cognitive Sciences

PAPERS

JÖRG GROSS, CAROLINE GRAF & CHARLOTTE S.L. ROSSETTI – The hidden costs of human cooperation
Cooperation enables humans to reshape entire environments and build complex societies. Although often celebrated, cooperation also has hidden costs. By presenting core mechanisms behind its emergence, we demonstrate that maintaining cooperation frequently relies on social control and coercion, which can lead to extortion and discrimination. Group cooperation further necessitates defining who belongs to the group, fostering exclusion and intergroup conflict. Free-rider concerns fuel scapegoating and polarization. These downsides challenge the notion of cooperation as a simple success story. The resulting conundrum for scientists is not just to explain cooperation but to identify institutions that harness its benefits while limiting its risks. Understanding these complexities is crucial to ensuring that human cooperation serves the common good rather than deepening social divides.
https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(25)00269-4

SVEN L. MATTYS et al – Reconceptualizing cognitive listening

Research on 'cognitive listening' has grown exponentially in recent years. Lacking, however, is a conceptual framework to organize the abundance of data from the hearing, cognitive, and linguistic sciences. We offer the data-resource-language (DRL) framework that draws from the notions of data-limited and resource-limited processes to provide a roadmap for understanding the interaction between auditory sensitivity, cognitive resources, and linguistic knowledge during speech perception, especially in adverse conditions. The DRL framework explains how these three sets of abilities predict performance and resource engagement as a function of signal quality. It also provides a platform for characterizing similarities and differences in how normal-hearing, impaired-hearing, and non-native listeners process speech in challenging conditions.

https://www.cell.com/trends/cognitive-sciences/fulltext/S1364-6613(25)00253-0

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