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References

Afrika

Macholdt 2014

Enrico Macholdt et al., *Tracing Pastoralist Migrations to Southern Africa with Lactase Persistence Alleles*. Current Biology **24** (2014), 875–879.

CurrBiol24-0875-Supplement.xlsx

Enrico Macholdt, Vera Lede, Chiara Barbieri, Sununguko W. Mpoloka, Hua Chen, Montgomery Slatkin, Brigitte Pakendorf, & Mark Stoneking

Although southern African Khoisan populations are often assumed to have remained largely isolated during prehistory, there is growing evidence for a migration of pastoralists from eastern Africa some 2,000 years ago [1–5], prior to the arrival of Bantu-speaking populations in southern Africa. Eastern Africa harbors distinctive lactase persistence (LP) alleles [6–8], and therefore LP alleles in southern African populations may be derived from this eastern African pastoralist migration. We sequenced the lactase enhancer region in 457 individuals from 18 Khoisan and seven Bantu-speaking groups from Botswana, Namibia, and Zambia and additionally genotyped four short tandem repeat (STR) loci that flank the lactase enhancer region. We found nine single-nucleotide polymorphisms, of which the most frequent is 214010*C, which was previously found to be associated with LP in Kenya and Tanzania and to exhibit a strong signal of positive selection [8]. This allele occurs in significantly higher frequency in pastoralist groups and in Khoe-speaking groups in our study, supporting the hypothesis of a migration of eastern African pastoralists that was primarily associated with Khoe speakers [2]. Moreover, we find a signal of ongoing positive selection in all three pastoralist groups in our study, as well as (surprisingly) in two foraging groups.

Aktuell

Bohannon 2015

John Bohannon, *Hoax-detecting software spots fake papers*. science **348** (2015), 18–19.

Gabrielsen 2015

Paul Gabrielsen, *Profile of Melinda A. Zeder*. PNAS **112** (2015), 5259–5260.

Her research not only focused on archaeological and genetic biomarkers of domestication in both plants and animals but also sought to refine the temporal and geographic context of initial domestication and agricultural origins in the Near East and explore the reasons why humans and their plant and animal partners embarked on pathways that led to domestication and agriculture worldwide.

Letters 2015

Jennifer Sills, *NextGen's tools for the future*. science **348** (2015), 32–35.

In January, we asked young scientists to name and describe a currently nonexistent invention that would make them more effective scientists.

QKnowledge is an AI system that can parse publications, solve inconsistencies between them, and present them in a single easy-to-read document. Just power it on, connect it to the Internet and a printer, use your natural voice to tell it what you are looking for, and print the generated document.

Malhotra 2015

A. Malhotra, T. Noakes & S. Phinney, *It is time to bust the myth of physical inactivity and obesity*, *You cannot outrun a bad diet*. British Journal of Sports Medicine (2015), preprint, 1–2. DOI:10.1136/bjsports-2015-094911.

BrJSportsMed2015-Malhotra-PressRelease.pdf

Regular physical activity reduces the risk of developing cardiovascular disease, type 2 diabetes, dementia and some cancers by at least 30 %. However, physical activity does not promote weight loss.

It is where the calories come from that is crucial. Sugar calories promote fat storage and hunger. Fat calories induce fullness or 'satiation'. A recently published critical review in nutrition concluded that dietary carbohydrate restriction is the single most effective intervention for reducing all the features of the metabolic syndrome and should be the first approach in diabetes management, with benefits occurring even without weight loss.

Sullins 2015

D. Paul Sullins1, *Emotional Problems among Children with Same-Sex Parents*, *Difference by Definition*. British Journal of Education, Society & Behavioural Science **7** (2015), 99–120.

Aims: To test whether small non-random sample findings that children with same-sex parents suffer no disadvantage in emotional well-being can be replicated in a large population sample; and examine the correlates of any differences discovered.

Methodology: Using a representative sample of 207,007 children, including 512 with same-sex parents, from the U.S. National Health Interview Survey, prevalence in the two groups was compared for twelve measures of emotional problems, developmental problems, and affiliated service and treatment usage, with controls for age, sex, and race of child and parent education and income. Instruments included the Strengths and Difficulties Questionnaire (SDQ) and the Kessler Scale of Psychological Distress (SPD). Bivariate logistic regression models tested the effect of parent psychological distress, family instability, child peer stigmatization and biological parentage, both overall and by opposite-sex family structure.

Results: Emotional problems were over twice as prevalent (minimum risk ratio (RR) 2.4, 95 % confidence interval (CI) 1.7-3.0) for children with same-sex parents than for children with oppositesex parents. Risk was elevated in the presence of parent psychological distress (RR 2.7, CI 1.84.3, p (t) $<$ .001), moderated by family instability (RR 1.3, CI 1.2-1.4) and unaffected by stigmatization (RR 2.4, CI 1.4-4.2), though these all had significant direct effects on emotional problems. Biological parentage nullified risk both alone and in combination with any iteration of factors. Joint biological parents were associated with the lowest rate of child emotional problems by a factor of 4 relative to same-sex parents, accounting for the bulk of the overall same-sex/oppositesex difference.

Conclusion: Joint biological parentage, the modal condition for opposite-sex parents but not possible for same-sex parents, sharply differentiates between the

two parent groups on child emotional problem outcomes. For child well-being the two groups differ by definition. Intact opposite-sex marriage ensures children of the persistent presence of their joint biological parents; same-sex marriage ensures the opposite. Further work is needed to determine the mechanisms involved.

Keywords: National health interview survey; same-sex parents; child emotional problems; stigmatization; biological parentage.

Sullins 2015

D. Paul Sullins, *Child Attention-Deficit Hyperactivity Disorder (ADHD) in Same-Sex Parent Families in the United States, Prevalence and Comorbidities*. British Journal of Medicine & Medical Research **6** (2015), 987–998.

Aims: This paper presents the first population data on attention-deficit hyperactivity disorder (ADHD) among children raised by same-sex parents with the aims 1) to test whether residence with same-sex parents is associated with higher ADHD prevalence, and 2) to observe and assess any clinically significant aggravators or comorbidities.

Methodology: Aggregate data for 1997-2013 from the U.S. National Health Interview Survey yielded a representative sample of children from 207,007 households, including 512 with same-sex parents, permitting inferential comparisons.

Results: ADHD was more than twice (OR 2.4, 95 % CL 1.6-3.4) as prevalent among children with same-sex parents than in the general population, after controlling for age, sex, ethnicity and parent SES. Comorbidities with general emotional problems and defiance behavior were standard. ADHD risk with same-sex parents was reduced among adopted children (OR 0.54, 95 % CL .27-1.1), null in the presence of parent psychological distress, and substantially elevated in the presence of stigmatization (OR 7.3, 95 % CL 1.4-38.1). In same-sex families, children with ADHD were over seven times (OR 7.5, 95 % CL 1.2-46.8) more likely to suffer stigmatization due to impaired interpersonal coping skills.

Conclusion: Diagnostic intake for ADHD should include parent sexual orientation, and treatment programs should include resources to bolster anti-victimization skills, particularly for children with same-sex parents. Results suggest the presence of shared genetic factors for same-sex attraction and ADHD, though more research is needed to confirm.

Keywords: National health interview survey; same-sex parents; ADHD; attention-deficit hyperactivity disorder; stigmatization.

Sullins 2015

D. Paul Sullins, *Bias in Recruited Sample Research on Children with Same-Sex Parents Using the Strength and Difficulties Questionnaire (SDQ)*. Journal of Scientific Research & Reports **5** (2015), 375–387.

Aims: To test for the presence of bias on use of a common psychometric instrument, the Strengths and Difficulties Questionnaire (SDQ), in studies of children with same-sex parents using a recruited convenience sample.

Study Design: Non-parametric quasi-experimental two-group comparison.

Methodology: Results from five qualifying studies, two with random samples and three with recruited samples, were compared with normative population data, assessing the percent of comparisons favorable or unfavorable to children with same-sex parents for six subscale measures.

Results: In the recruited samples 79.3 % (range: 75-83) of comparisons were favorable to children with same-sex parents, compared with no favorable comparisons (0 %, range 0-0) in the random samples. Two additional random samples

with related measures were also adduced, also with no favorable comparisons (0 %, range 0-0).

Conclusion: Evidence suggests strong bias resulting in false positive outcomes for parentreported SDQ in recruited samples of same-sex parents.

Keywords: Same-sex parents; child emotional problems; strengths and difficulties questionnaire (SDQ); survey bias.

Underwood 2015

Emily Underwood, *Measuring child abuse's legacy*. science **347** (2015), 1408.

First large-scale, longitudinal study tracks abuse and neglect across generations.

When the team broke the data down by forms of abuse, however, the results were surprising. According to the CPS data, children whose parents had been physically abused were no more at risk of physical abuse than those in the comparison group, a finding that directly contradicts the "cycle of violence."

The study highlights a different kind of potential bias against parents with a formal record of being abused as children. Those who told surveyors they had abused their kids, or whose kids described being abused, were 2.5 times more likely to be reported to CPS than parents in the control group who admitted to abusing their children, or whose kids said they had been mistreated. This disparity suggests that parents previously known to the system as victims are far more likely to flagged as abusers by social service programs, Widom says.

Widom 2015

Cathy Spatz Widom, Sally J. Czaja & Kimberly A. DuMont, *Intergenerational transmission of child abuse and neglect, Real or detection bias?* science **347** (2015), 1480–1485.

s347-1480-Supplement.pdf

The literature has been contradictory regarding whether parents who were abused as children have a greater tendency to abuse their own children. A prospective 30-year follow-up study interviewed individuals with documented histories of childhood abuse and neglect and matched comparisons and a subset of their children. The study assessed maltreatment based on child protective service (CPS) agency records and reports by parents, nonparents, and offspring. The extent of the intergenerational transmission of abuse and neglect depended in large part on the source of the information used. Individuals with histories of childhood abuse and neglect have higher rates of being reported to CPS for child maltreatment but do not self-report more physical and sexual abuse than matched comparisons. Offspring of parents with histories of childhood abuse and neglect are more likely to report sexual abuse and neglect and that CPS was concerned about them at some point in their lives. The strongest evidence for the intergenerational transmission of maltreatment indicates that offspring are at risk for childhood neglect and sexual abuse, but detection or surveillance bias may account for the greater likelihood of CPS reports.

Anthropologie

Spoor 2007

F. Spoor et al., *Implications of new early Homo fossils from Ileret, east of Lake Turkana, Kenya*. nature **448** (2007), 688–691.

n448-0688-Supplement.pdf

F. Spoor, M. G. Leakey, P. N. Gathogo, F. H. Brown, S. C. Antón, I. McDougall, C. Kiarie, F. K. Manthi & L. N. Leakey

Sites in eastern Africa have shed light on the emergence and early evolution of the genus Homo1–6. The best known early hominin species, H. habilis and H. erectus, have often been interpreted as time-successive segments of a single anagenetic evolutionary lineage 3,7–10. The case for this was strengthened by the discovery of small early Pleistocene hominin crania from Dmanisi in Georgia that apparently provide evidence of morphological continuity between the two taxa11,12. Here we describe two new cranial fossils from the Koobi Fora Formation, east of Lake Turkana in Kenya, that have bearing on the relationship between species of early Homo. A partial maxilla assigned to H. habilis reliably demonstrates that this species survived until later than previously recognized, making an anagenetic relationship with H. erectus unlikely. The discovery of a particularly small calvaria of H. erectus indicates that this taxon overlapped in size with H. habilis, and may have shown marked sexual dimorphism. The new fossils confirm the distinctiveness of H. habilis and H. erectus, independently of overall cranial size, and suggest that these two early taxa were living broadly sympatrically in the same lake basin for almost half a million years.

Stahl 2015

Aimee E. Stahl & Lisa Feigenson, *Observing the unexpected enhances infants' learning and exploration*. science **348** (2015), 91–94.

s348-0091-Supplement.pdf, s348-0091-Supplement1.mov, s348-0091-Supplement2.mov, s348-0091-Supplement3.mov, s348-0091-Supplement4.mov, s348-0091-Supplement5.mov, s348-0091-Supplement6.mov

Given the overwhelming quantity of information available from the environment, how do young learners know what to learn about and what to ignore? We found that 11-month-old infants (N = 110) used violations of prior expectations as special opportunities for learning. The infants were shown events that violated expectations about object behavior or events that were nearly identical but did not violate expectations. The sight of an object that violated expectations enhanced learning and promoted information-seeking behaviors; specifically, infants learned more effectively about objects that committed violations, explored those objects more, and engaged in hypothesis-testing behaviors that reflected the particular kind of violation seen. Thus, early in life, expectancy violations offer a wedge into the problem of what to learn.

Bibel

Choat 2014

Malcolm Choat, *The Gospel of Jesus's Wife: A Preliminary Paleographical Assessment*. Harvard Theological Review **107** (2014), 160–162.

Overall, if the general appearance of the papyrus prompts some suspicion, it is difficult to falsify by a strictly paleographical examination. This should not be taken as proof that the papyrus is genuine, simply that its handwriting and the manner in which it has been written do not provide definitive grounds for proving otherwise.

Depuydt 2014

Leo Depuydt, *The Alleged Gospel of Jesus's Wife, Assessment and Evaluation of Authenticity*. Harvard Theological Review **107** (2014), 172–189.

All this brings one to the surreal. I personally—and I am not sure whether I share this feeling with anyone—experience a certain incredulity pertaining to how something that is at first sight so patently fake could be so totally blown out of proportion. If this sounds too strong, please understand that I am just trying to find words to express my heartfelt opinion.

Hachlili 2015

Rachel Hachlili, *Synagogues—Before and after the Roman Destruction of the Temple*. Biblical Archaeology Review **41** (2015), iii, 30–38, 65.

Were there synagogues before the Romans destroyed the Temple, or did they develop only afterward? Communal structures from the Second Temple period have been discovered, but should they be considered synagogues even though they don't share the major architectural feature common to post-destruction synagogues?

Hodgins 2014

Gregory Hodgins, *Accelerated Mass Spectrometry Radiocarbon Determination of Papyrus Samples*. Harvard Theological Review **107** (2014), 166–169.

The d13C value of AA-101794 is lower than is typical for other radiocarbon-dated papyri and requires explanation. It might indicate the presence of a contaminant or have some other explanation. The presence of a contaminant with a different radiocarbon content than the papyrus would alter the bulk radiocarbon content. Consequently the low d13C value sheds doubt upon the validity of the radiocarbon date. A discussion of the d13C measurement is presented in a separate document.

King 2014

Karen L. King, *"Jesus said to them, 'My wife . . . '", A New Coptic Papyrus Fragment*. Harvard Theological Review **107** (2014), 131–131.

This article offers a critical edition of a papyrus fragment in Coptic that contains a dialogue between Jesus and his disciples in which Jesus speaks of "my wife." The fragment does not provide evidence that the historical Jesus was married but concerns an early Christian debate over whether women who are wives and mothers can be disciples of Jesus. Solely for purposes of reference, the fragment is given the title The Gospel of Jesus's Wife (GJW).

The most historically reliable early Christian literature is silent about Jesus's marital status, and the GJW fragment does not change that situation. It is not evidence that Jesus was married, but it does appear to support the favorable position on marriage and reproduction taken by the canonical 1 Timothy, and it stands on the side of Jesus as he refutes the statement of Peter in Gos. Thom. 114 that "women are not worthy of life." Although we cannot know whether this damaged fragment supported the ancient patriarchal household order or argued that females should become male as these writings do, it does seem to enter debates over whether Jesus's incarnate life pointed toward marriage or celibacy as the ideal mode of Christian life. Ultimately such questions raise theological issues of whether sexuality belongs to being fully human or necessarily compromises holiness. In my reading, however, the main point of the GJW fragment is simply to affirm that women who are wives and mothers can be Jesus's disciples.

King 2014

Karen L. King, *The Alleged Gospel of Jesus's Wife: Assessment and Evaluation of Authenticity, Response to Leo Depuydt*. Harvard Theological Review **107** (2014), 190–193.

In conclusion, Depuydt's essay does not offer any substantial evidence or persuasive argument, let alone unequivocal surety, that the GJW fragment is a modern fabrication (forgery). Should the fragment be proved on other grounds to be such, a few of these observations may, however, be useful in hypothesizing how it may have been done.

Shanks 2015

Hershel Shanks, *The Saga of the Gospel of Jesus' Wife*. Biblical Archaeology Review **41** (2015), iii, 54–59.

When Harvard's Karen King announced at a 2012 scholarly conference in Rome that a fragment of an authentic fourth-century gospel had come into her hands in which Jesus, speaking in the first person, refers to "my wife," that was only the beginning.

So what does this have to do with the "Gospel of Jesus' Wife"? Answer: "The Gospel of Jesus' Wife" is written in the same hand and with the same writing instrument as the fragment of CGJ. It came to King with the "Gospel of Jesus' Wife." Moreover, both fragments are written in Lycopolitan, a relatively late dialect of Coptic. In short, whoever penned the "Gospel of Jesus' Wife" also copied the fragment of CGJ. If one is a forgery, the other is a forgery.

Is the "Gospel of Jesus' Wife" 100 percent a forgery? Not quite. But even King has acknowledged that "this argument [for forgery] is substantive. It's worth taking seriously. And it may point in the direction of forgery."

Tuross 2014

Noreen Tuross, *Accelerated Mass Spectrometry Radiocarbon Determination of Papyrus Samples*. Harvard Theological Review **107** (2014), 170–171.

Gospel of Jesus's Wife, 659 cal CE to 869 cal CE, Median date: 741 cal CE

Watson 2012

Francis Watson, *The Gospel of Jesus' Wife, How a fake Gospel-Fragment was composed*. Mark Goodacre's NT Blog **2012**, Sep. 27. <http://ntweblog.blogspot.co.uk/2012/09/revised-versions-of-francis-watsons.html> (2015-04-25).

NTBlog2012-09.27-Addendum.pdf, NTBlog2012-09.27-Summary.pdf

The eight lines of GJW recto are derived from the Coptic GTh, virtually in their entirety, making dependence certain – a highly unusual form of dependence on words more than sense. The compiler has used a "collage" or "patchwork" compositional technique, and this level of dependence on extant pieces of Coptic text is more plausibly attributed to a modern author, with limited facility in Coptic, than to an ancient one. Indeed, the GJW fragment may be designedly incomplete, its lacunae built into it from the outset. It does not seem possible to fill these lacunae with GTh material contiguous to the fragments cited. The impression of modernity is reinforced by the case in line 1 of dependence on the line-division of the one surviving Coptic manuscript, easily accessible in modern printed editions. Unless this impression of modernity is countered by further investigations and fresh considerations, it seems unlikely that GJW will establish itself as a "genuine" product of early gospel writing.

Yardley 2014

James T. Yardley & Alexis Hagadorn, *Characterization of the Chemical Nature of the Black Ink in the Manuscript of The Gospel of Jesus's Wife through Micro-Raman Spectroscopy*. Harvard Theological Review **107** (2014), 162–164.

1) The inks used in this manuscript are primarily based on carbon black pigments such as "lamp black." The observed Raman spectra are very similar to those of the carbon-based inks studied for a wide variety of manuscripts including many dating from the early centuries of the Christian era.

2) From the observed Raman spectra, we find no evidence for any constituents of ink or types of ink other than carbon black in the selected regions.

3) The ink or inks used in GJW are similar to, but distinct from, the ink used for the Gospel of John manuscript.

4) Within the available accuracy of our measurements, our data are consistent with a single ink composition for each individual side of the GJW manuscript.

5) The Raman spectra obtained from the "recto" side and from the "verso" side are indistinguishable within our experimental error.

Biologie

Ruiz-Lopez 2015

Noemi Ruiz-Lopez, Richard P. Haslam, Sarah Usher, Johnathan A. Napier & & Olga Sayanova, *An alternative pathway for the effective production of the omega-3 long-chain polyunsaturates EPA and ETA in transgenic oilseeds*. Plant Biotechnology Journal (2015), preprint, 1–12. DOI:10.1111/pbi.12328.

PlantBiotech2015-Ruiz-Lopez-Supplement1.pptx, PlantBiotech2015-Ruiz-Lopez-Supplement2.xlsx

The synthesis and accumulation of omega-3 long-chain polyunsaturated fatty acids in transgenic Camelina sativa is demonstrated using the so-called alternative pathway. This aerobic pathway is found in a small number of taxonomically unrelated unicellular organisms and utilizes a C18 D9-elongase to generate C20 PUFAs. Here, we evaluated four different combinations of seedspecific transgene-derived activities to systematically determine the potential of this pathway to direct the synthesis of eicosapentaenoic acid (EPA) in transgenic plants. The accumulation of EPA and the related omega-3 LC-PUFA eicosatetraenoic acid (ETA) was observed up to 26.4 % of total seed fatty acids, of which ETA was 9.5 %. Seed oils such as these not only represent an additional source of EPA, but also an entirely new source of the bona fide fish oil ETA. Detailed lipidomic analysis of the alternative pathway in Camelina revealed that the acyl-substrate preferences of the different activities in the pathway can still generate a substrate-dichotomy bottleneck, largely due to inefficient acyl-exchange from phospholipids into the acyl-CoA pool. However, significant levels of EPA and ETA were detected in the triacylglycerols of transgenic seeds, confirming the channelling of these fatty acids into this storage lipid.

Keywords: metabolic engineering, lipids, omega-3 polyunsaturated fatty, acids, transgenic, Camelina

Victora 2015

Cesar G. Victora et al., *Association between breastfeeding and intelligence, educational attainment, and income at 30 years of age*, *A*

prospective birth cohort study from Brazil. Lancet Global Health **3** (2015), e199–e205.

LancetGlobH03-e0199-Supplement.pdf

Cesar G Victora, Bernardo Lessa Horta, Christian Loret de Mola, Luciana Quevedo, Ricardo Tavares Pinheiro, Denise P Gigante, Helen Gonçalves, Fernando C Barros

Background Breastfeeding has clear short-term benefits, but its long-term consequences on human capital are yet to be established. We aimed to assess whether breastfeeding duration was associated with intelligence quotient (IQ), years of schooling, and income at the age of 30 years, in a setting where no strong social patterning of breastfeeding exists.

Methods A prospective, population-based birth cohort study of neonates was launched in 1982 in Pelotas, Brazil. Information about breastfeeding was recorded in early childhood. At 30 years of age, we studied the IQ (Wechsler Adult Intelligence Scale, 3rd version), educational attainment, and income of the participants. For the analyses, we used multiple linear regression with adjustment for ten confounding variables and the G-formula.

Findings From June 4, 2012, to Feb 28, 2013, of the 5914 neonates enrolled, information about IQ and breastfeeding duration was available for 3493 participants. In the crude and adjusted analyses, the durations of total breastfeeding and predominant breastfeeding (breastfeeding as the main form of nutrition with some other foods) were positively associated with IQ, educational attainment, and income. We identified dose-response associations with breastfeeding duration for IQ and educational attainment. In the confounder-adjusted analysis, participants who were breastfed for 12 months or more had higher IQ scores (difference of 3 • 76 points, 95 % CI 2 • 20–5 • 33), more years of education (0 • 91 years, 0 • 42–1 • 40), and higher monthly incomes (341 • 0 Brazilian reals, 93 • 8–588 • 3) than did those who were breastfed for less than 1 month. The results of our mediation analysis suggested that IQ was responsible for 72 % of the effect on income.

Interpretation Breastfeeding is associated with improved performance in intelligence tests 30 years later, and might have an important effect in real life, by increasing educational attainment and income in adulthood.

Funding Wellcome Trust, International Development Research Center (Canada), CNPq, FAPERGS, and the Brazilian Ministry of Health.

Datierung

Hellstrom 2015

John Hellstrom & Robyn Pickering, *Recent advances and future prospects of the U-Th and U-Pb chronometers applicable to archaeology.* Journal of Archaeological Science **56** (2015), 32–40.

The U-Th chronometer has revolutionized Quaternary science in the last few decades and can now be considered a well-established, mature technique with growing application in archaeology as an alternative to 14C dating and OSL, reaching well beyond the cutoff for both these methods. Applying the U-Pb technique to material within a time frame of interest to archaeology is a challenge only recently overcome, with enormous potential for future development and use. In terms of range, U-Th can generally date material of between a few years and as much as 600 ka, while U-Pb is best suited to material of 1 million years and older. U-Th dating is typically precise, with error margins of better than 1 % routinely achievable for material of the last interglacial age or younger. Such precision is possible with U-Pb dating in the mid-Quaternary but most ages have uncertainties in the

5–10 % range. Carbonates are the most desirable U-series target material, with closed system behaviour being particularly important for U-Th dating; making inorganic deposits such as speleothems (secondary cave carbonates), tufa and calcrete ideal. Some biogenic carbonates such as coral and eggshell are often amenable to U-series dating, but less ideal material such as fossil teeth, bone and mollusc shell usually continue to gain uranium after deposition meaning accurate ages cannot be calculated. In all cases, the importance of a thorough understanding of the context of dated material cannot be overstated. In this contribution we review U-Th and U-Pb dating through an archaeological lens, focussing on the methods themselves; how to best interpret published data and how best to avoid common pitfalls. We highlight the major successes through a number of case studies and provide an overview of what we believe to be the future directions of this field.

Keywords: U-Th dating | U-Pb dating | Archaeometry | Speleothem | Cave deposits | Human evolution

Roberts 2015

Richard G. Roberts, Zenobia Jacobs, Bo Li, Nathan R. Jankowski, Alastair C. Cunningham & Anatoly B. Rosenfeld, *Optical dating in archaeology, Thirty years in retrospect and grand challenges for the future*. Journal of Archaeological Science **56** (2015), 41–60.

In 1982, when Richard Klein first became one of the Editors of this journal, the luminescence dating community was embarking on a new phase of exploratory research. Attention was turning from the use of thermoluminescence (TL) dating to estimate the time of last heating of archaeological objects, such as pottery and burnt flint, to the TL dating of unheated sediments that had been transported by wind and then deposited on the landscape. This revolutionary development enabled the extension of TL dating to sedimentary deposits in a variety of environmental settings and to the multitude of archaeological sites that lack suitably heated artefacts. In sediment dating, the age of most interest is usually the time elapsed since grains of quartz or feldspar were last exposed to sunlight, as the energy of the sun's rays is sufficient to evict electrons from their light-sensitive traps. These traps are steadily refilled after sediment deposition and the longer the grains remain buried, the more TL they will emit when measured. In 1985, Huntley and colleagues proposed 'optical dating' as a simpler and superior means of stimulating the light-sensitive traps in Quaternary sediments, and this is now the principal luminescence-based method of dating geological and archaeological deposits. Optical dating is an umbrella term for an armada of acronyms, the most common in archaeological contexts being OSL (optically stimulated luminescence), TT-OSL (thermally-transferred OSL), IRSL (infrared stimulated luminescence) and pIRIR (post-infrared IRSL). All of these variants are founded on the same basic tenet – measurement of a light-sensitive signal to determine (typically) the last time that sediment grains were sun-bleached – but each approach has its virtues and vices. In this paper, we review this 'family' of luminescence dating techniques and look back on 30 years of optical dating in archaeology. Some of the more interesting and important achievements are highlighted, including the critical insights gained in the last two decades from OSL measurements of individual grains of quartz. We also look to the future of optical dating in archaeological contexts. Efforts to extend the age limits of optical dating to older hominin and archaeological sites will remain a key goal, and understanding how archaeological sites – of all ages – form and evolve over time could be improved greatly by combining micromorphology analysis with optical dating of undisturbed (intact) sediments. The latter poses a series of particularly formidable technical challenges, but if the past is any guide to

the future, then we can expect optical dating to illuminate much more of human history before celebrating its Golden Jubilee.

Keywords: Luminescence dating | Quartz | Feldspar | OSL | IRSL | pIRIR | Equivalent dose | Dose rate | Single grains

Energie

Burtt 2015

D. Burtt & P. Dargusch, *The cost-effectiveness of household photovoltaic systems in reducing greenhouse gas emissions in Australia, Linking subsidies with emission reductions.* Applied Energy **148** (2015), 439–448.

Highlights

– Payback period for Australian household PV fell to four years in 2011 and 2012.
– PV became attractive due to high feed-in tariffs and declining PV costs.
– Cost was AU$ 200/t CO2e in 2010, expected to be AU$ 65 to AU$ 100/t CO2e by 2020.
– PV resulted in greenhouse gas emissions reducing by 3.7 million t CO2e in 2013.
– PV expected to reduce greenhouse gas emissions by 8 million t CO2e in 2020.

Abstract This paper examines the cost-effectiveness of subsidies (feed-in tariffs and renewable energy credits) paid for by electricity consumers to support the uptake of roof top photovoltaic (PV) systems by households in Australia. We estimate annual payback periods, and then regress these against the actual uptake of household PV and associated emission reductions, creating a relationship not apparent in other research. Sensitivity analysis reveals that the declining cost of PV panels had most impact on PV uptake followed by feed-in tariffs, renewable energy credits and the increasing cost of household electricity tariffs. Our modelling shows that feed-in tariffs were higher than necessary to achieve the resultant levels of PV uptake and that the low cost of PV panels and comparatively high electricity tariffs are likely to result in a continuing strong uptake of household PV in Australia. Our modelling shows that subsidies peaked in 2011 and 2012, with payback periods of three to four years, having since increased to ve to six years. Emission reduction costs are expected to reduce from over AU$ 200 per t CO2e in 2013 to between AU$ 65 and AU$ 100 per t CO2e in 2020. Household PV reduced Australia's emissions by 3.7 million t CO2e in 2013 (1.7 % of Australia's total emissions) and is expected to reach eight million tonnes (3.7 % of Australia's total emissions) by 2020.

Keywords: Feed-in tariffs | Household PV | Payback periods

Isotope

Makarewicz 2015

Cheryl A. Makarewicz & Judith Sealy, *Dietary reconstruction, mobility, and the analysis of ancient skeletal tissues, Expanding the prospects of stable isotope research in archaeology.* Journal of Archaeological Science **56** (2015), 146–158.

The use of stable isotope ratio analysis in archaeology has exploded over the past few decades to the point where it is now an established tool that is routinely used to investigate questions relating to diet and mobility. Early applications focused mostly on the analysis of human skeletal tissues as a way to reconstruct

major shifts in human diet, but current stable isotopic approaches have expanded to include high resolution analyses of human, animal, and plant remains, which are helping to better define the resource exploitation and management strategies that underscore changes in the human diet. In addition, stable isotopic data sets are now regularly filtered through interpretive archaeological theoretical frameworks to explore socially mediated food acquisition and consumption choices, mortuary practices, and social identity. Much work remains to be done in documenting the biological and ecological variation in the distribution of stable isotopes in ancient food webs and the mechanisms responsible for the isotopic signals observed in archaeological plant and animal tissues. Here, we identify several areas in stable isotope analysis where additional 'first principles' driven research would help to improve existing isotopic methods, or develop new ones, and consequently improve our ability to answer questions of archaeological significance. We consider the strengths and limitations of the application of stable isotope analysis to ancient skeletal material obtained from archaeological contexts. We also pay particular attention to nitrogen isotopic variation in ancient ecosystems, organic oxygen and hydrogen isotopes; to mixing models as a means of estimating source contributions in human diet, mobility, and isoscapes; and to how compound specific analyses may help detangle dietary routing. We conclude with a plea for greater scientific rigour and more informed use of stable isotope analyses and call for a closer integration of stable isotope analysis with other aspects of archaeological research programmes, in order to optimise the information that isotopes can provide.

Keywords: Dietary reconstruction | Nitrogen | Oxygen | Hydrogen | Isoscapes | Mixing-model | Dietary routing | Amino-acid

Kultur

Bell 2015

Adrian Viliami Bell, *Linking Observed Learning Patterns to the Evolution of Cultural Complexity*. Current Anthropology **56** (2015), 277–281.

Demographic effects on cultural complexity are controversial. Some view the arguments for cultural drift and similar mechanisms as overstating the importance of difficulty in learning, socially or individually. Others stress that social learning is vital, and larger social groups with active cultural transmission yield greater cultural complexity. Using ethnographic data collected among women weavers in the South Pacific, I advance the debate by estimating learning parameters directly relevant to a theoretical model of the evolution of cultural complexity. Through a sensitivity analysis of the estimated model, I show potential learning effects on the production rate of a prestigious cultural good. I advocate further ethnographic work to understand the learning process in naturalistic contexts, as vital to advancing our knowledge of the origins and persistence (or not) of cultural complexity in past and contemporary societies.

Frumin 2015

Idan Frumin et al., *A social chemosignaling function for human handshaking*. eLife **4** (2015), e5154.

eLife04-e05154-Supplement.htm, eLife04-e05154-Supplement1.mp4, eLife04-e05154-Supplement2.mp4, eLife04-e05154-Supplement3.mp4, eLife04-e05154-Supplement4.mp4, eLife04-e05154-Supplement5.xlsx, eLife04-e05154-Supplement6.xlsx

Idan Frumin, Ofer Perl, Yaara Endevelt-Shapira, Ami Eisen, Neetai Eshel, Iris Heller, Maya Shemesh, Aharon Ravia, Lee Sela, Anat Arzi & Noam Sobel

Social chemosignaling is a part of human behavior, but how chemosignals transfer from one individual to another is unknown. In turn, humans greet each other with handshakes, but the functional antecedents of this behavior remain unclear. To ask whether handshakes are used to sample conspecific social chemosignals, we covertly filmed 271 subjects within a structured greeting event either with or without a handshake. We found that humans often sniff their own hands, and selectively increase this behavior after handshake. After handshakes within gender, subjects increased sniffing of their own right shaking hand by more than 100 %. In contrast, after handshakes across gender, subjects increased sniffing of their own left non-shaking hand by more than 100 %. Tainting participants with unnoticed odors significantly altered the effects, thus verifying their olfactory nature. Thus, handshaking may functionally serve active yet subliminal social chemosignaling, which likely plays a large role in ongoing human behavior.

Kienlin 2015

Tobias L. Kienlin, *A Hero is a Hero is a . . . ? On Homer and Bronze Age Social Modelling*. (Unpublished 2015). <http://www.academia.edu/attachments/37435631/download_file>.

There is neither linear social evolution nor does history repeat itself. And there is no archetype 'hero' irrespective of social and cultural context. Even if male aspirations to heroic grandeur were universal, human agency is firmly tied to historical context. There is no immutable outcome to any such aspirations and social strategies.

Williams 2015

Wendy M. Williams & Stephen J. Ceci, *National hiring experiments reveal 2:1 faculty preference for women on STEM tenure track*. PNAS **112** (2015), 5360–5365.

National randomized experiments and validation studies were conducted on 873 tenure-track faculty (439 male, 434 female) from biology, engineering, economics, and psychology at 371 universities/ colleges from 50 US states and the District of Columbia. In the main experiment, 363 faculty members evaluated narrative summaries describing hypothetical female and male applicants for tenure-track assistant professorships who shared the same lifestyle (e.g., single without children, married with children). Applicants' profiles were systematically varied to disguise identically rated scholarship; profiles were counterbalanced by gender across faculty to enable between-faculty comparisons of hiring preferences for identically qualified women versus men. Results revealed a 2:1 preference for women by faculty of both genders across both math-intensive and non–math-intensive fields,with the single exception of male economists, who showed no gender preference. Results were replicated using weighted analyses to control for national sample characteristics. In follow-up experiments, 144 faculty evaluated competing applicants with differing lifestyles (e.g., divorced mother vs. married father), and 204 faculty compared same-gender candidates with children, but differing in whether they took 1-y-parental leaves in graduate school. Women preferred divorced mothers to married fathers; men preferred mothers who took leaves to mothers who did not. In two validation studies, 35 engineering faculty provided rankings using full curricula vitae instead of narratives, and 127 faculty rated one applicant rather than choosing fromamixed-gender group; the same preference for women was shown by faculty of both genders. These results suggest it is a propitious time for women launching careers in academic science. Messages to the contrary may discourage women from applying for STEM (science, technology, engineering, mathematics) tenure-track assistant professorships.

Keywords: gender bias | hiring bias | underrepresentation of women | faculty hiring | women in science

Significance: The underrepresentation of women in academic science is typically attributed, both in scientific literature and in the media, to sexist hiring. Here we report five hiring experiments in which faculty evaluated hypothetical female and male applicants, using systematically varied profiles disguising identical scholarship, for assistant professorships in biology, engineering, economics, and psychology. Contrary to prevailing assumptions, men and women faculty members from all four fields preferred female applicants 2:1 over identically qualified males with matching lifestyles (single, married, divorced), with the exception of male economists, who showed no gender preference. Comparing different lifestyles revealed that women preferred divorced mothers to married fathers and that men preferred mothers who took parental leaves to mothers who did not. Our findings, supported by real-world academic hiring data, suggest advantages for women launching academic science careers.

Physik

Borsanyi 2015

Sz. Borsanyi et al., *Ab initio calculation of the neutron-proton mass difference*. science **347** (2015), 1452–1455.

s347-1452-Supplement.pdf

Sz. Borsanyi, S. Durr, Z. Fodor, C. Hoelbling, S. D. Katz, S. Krieg, L. Lellouch, T. Lippert, A. Portelli, K. K. Szabo & B. C. Toth

The existence and stability of atoms rely on the fact that neutrons are more massive than protons. The measured mass difference is only 0.14 % of the average of the two masses. A slightly smaller or larger value would have led to a dramatically different universe. Here, we show that this difference results from the competition between electromagnetic and mass isospin breaking effects. We performed lattice quantum-chromodynamics and quantum-electrodynamics computations with four nondegenerate Wilson fermion flavors and computed the neutron-proton mass-splitting with an accuracy of 300 kilo–electron volts, which is greater than 0 by 5 standard deviations. We also determine the splittings in the S, X, D, and Xcc isospin multiplets, exceeding in some cases the precision of experimental measurements.

Harvey 2015

David Harvey, Richard Massey, Thomas Kitching, Andy Taylor & Eric Tittley, *The nongravitational interactions of dark matter in colliding galaxy clusters*. science **347** (2015), 1462–1465.

s347-1462-Supplement.pdf

Collisions between galaxy clusters provide a test of the nongravitational forces acting on dark matter. Dark matter's lack of deceleration in the "bullet cluster" collision constrained its self-interaction cross section sDM/m < 1.25 square centimeters per gram (cm2/g) [68 % confidence limit (CL)] (sDM, self-interaction cross section; m, unit mass of dark matter) for long-ranged forces. Using the Chandra and Hubble Space Telescopes, we have now observed 72 collisions, including both major and minor mergers. Combining these measurements statistically, we detect the existence of dark mass at 7.6s significance. The position of the dark mass has remained closely aligned within 5.8 ± 8.2 kiloparsecs of associated stars, implying a self-interaction cross section sDM/m < 0.47 cm2/g (95 % CL) and disfavoring some proposed extensions to the standard model.

Story or Book

Derrible 2015

Sybil Derrible, *Seeing the forest for the trees, Using approximation as a tool for improving understanding.* science **347** (2015), 1426.

The Art of Insight in Science and Engineering. Mastering Complexity. Sanjoy Mahajan. MIT Press, 2014. 408 pp.

We now live in a world obsessed with data, in which paper and pencil have been traded for code and algorithms. As a result, we often spend less time getting a feel for problems we are tackling than we would have 35 years ago. It was therefore very refreshing to read a book that encourages the reader to do just that.

Senior undergraduate and graduate students will likely enjoy the book because it encourages them to think beyond the equation, and it may help build mental connections between many concepts learned in classes. Researchers and other professionals stand to benefit from it as well.

Herr 2015

Larry G. Herr, *Murder,Mayhem and Resolve in Biblical Lachish.* Biblical Archaeology Review **41** (2015), iii, 60–62.

Biblical Lachish: A Tale of Construction, Destruction, Excavation and Restoration. By David Ussishkin. Translation by Miriam Feinberg Vamosh (Jerusalem: Israel Exploration Society and Biblical Archaeology Society, 2014), 446 pp., 326 illustr., $52

Ussishkin's archaeological integrity comes through in many pages. (1) He refuses to excavate all of major buildings, because something should be left for later excavators who may have superior methods and technologies. (2) He presents multiple sides of the most debatable topics even though he himself favors just one of them. (3) He respectfully and admiringly describes the results of the earlier British excavations under James Starkey and Olga Tufnell during the 1930s. (4) He has published this popular version of his story only after producing five massive volumes detailing the technical aspects of the dig and was thus able to take advantage of reactions from other scholars.