

References

Aktuell

GILBERT 2017

Denis Gilbert, *Oceans lose oxygen*. [nature 542 \(2017\), 303–304](#).

Oxygen is essential to most life in the ocean. An analysis shows that oxygen levels have declined by 2% in the global ocean over the past five decades, probably causing habitat loss for many fish and invertebrate species.

PERANI 2017

Daniela Perani et al., *The impact of bilingualism on brain reserve and metabolic connectivity in Alzheimer's dementia*. [PNAS 114 \(2017\), 1690–1695](#).

Daniela Perani, Mohsen Farsad, Tommaso Ballarini, Francesca Lubian, Maura Malpetti, Alessandro Fracchetti, Giuseppe Magnani, Albert March & Jubin Abutalebi

Cognitive reserve (CR) prevents cognitive decline and delays neurodegeneration. Recent epidemiological evidence suggests that lifelong bilingualism may act as CR delaying the onset of dementia by ≈ 4.5 y. Much controversy surrounds the issue of bilingualism and its putative neuroprotective effects. We studied brain metabolism, a direct index of synaptic function and density, and neural connectivity to shed light on the effects of bilingualism in vivo in Alzheimer's dementia (AD). Eighty-five patients with probable AD and matched for disease duration (45 German-Italian bilingual speakers and 40 monolingual speakers) were included. Notably, bilingual individuals were on average 5 y older than their monolingual peers. In agreement with our predictions and with models of CR, cerebral hypometabolism was more severe in the group of bilingual individuals with AD. The metabolic connectivity analyses crucially supported the neuroprotective effect of bilingualism by showing an increased connectivity in the executive control and the default mode networks in the bilingual, compared with the monolingual, AD patients. Furthermore, the degree of lifelong bilingualism (i.e., high, moderate, or low use) was significantly correlated to functional modulations in crucial neural networks, suggesting both neural reserve and compensatory mechanisms. These findings indicate that lifelong bilingualism acts as a powerful CR proxy in dementia and exerts neuroprotective effects against neurodegeneration. Delaying the onset of dementia is a top priority of modern societies, and the present in vivo neurobiological evidence should stimulate social programs and interventions to support bilingual or multilingual education and the maintenance of the second language among senior citizens.

Keywords: bilingualism | Alzheimer's dementia | fluorine-18-fluorodeoxyglucose PET | brain reserve | brain metabolic connectivity

Significance: Recent epidemiological studies report that lifelong bilingualism may delay dementia onset. However, the underlying neural mechanism of these protective effects is largely unknown. Using fluorodeoxyglucose and PET to investigate brain metabolism and neural connectivity in individuals with Alzheimer's dementia, we unravel the neural mechanism responsible for the bilingual individuals' ability to cope better with Alzheimer's dementia. These findings foster the view that lifelong bilingualism contributes to brain cognitive reserve.

SCHMIDTKO 2017

Sunke Schmidtke, Lothar Stramma & Martin Visbeck, *Decline in global oceanic oxygen content during the past five decades*. [nature 542 \(2017\), 335–339](#).

Ocean models predict a decline in the dissolved oxygen inventory of the global ocean of one to seven per cent by the year 2100, caused by a combination of a warming-induced decline in oxygen solubility and reduced ventilation of the deep ocean^{1,2}. It is thought that such a decline in the oceanic oxygen content could affect ocean nutrient cycles and the marine habitat, with potentially detrimental consequences for fisheries and coastal economies^{3–6}. Regional observational data indicate a continuous decrease in oceanic dissolved oxygen concentrations in most regions of the global ocean^{1,7–10}, with an increase reported in a few limited areas, varying by study^{1,10}. Prior work attempting to resolve variations in dissolved oxygen concentrations at the global scale reported a global oxygen loss of 550 ± 130 teramoles (10^{12} mol) per decade between 100 and 1,000 metres depth based on a comparison of data from the 1970s and 1990s¹⁰. Here we provide a quantitative assessment of the entire ocean oxygen inventory by analysing dissolved oxygen and supporting data for the complete oceanic water column over the past 50 years. We find that the global oceanic oxygen content of 227.4 ± 1.1 petamoles (10^{15} mol) has decreased by more than two per cent (4.8 ± 2.1 petamoles) since 1960, with large variations in oxygen loss in different ocean basins and at different depths. We suggest that changes in the upper water column are mostly due to a warming-induced decrease in solubility and biological consumption. Changes in the deeper ocean may have their origin in basin-scale multidecadal variability, oceanic over-turning slow-down and a potential increase in biological consumption^{11,12}.

SCUDELLARI 2017

Megan Scudellari, *Cleaning up the hygiene hypothesis*. [PNAS 114 \(2017\), 1433–1436](#).

The rise of allergy and autoimmune diseases is due to much more than rampant cleanliness. Is it time to throw out the hygiene hypothesis?

SMITH 2017

Martin D. Smith, Atle Oglend, A. Justin Kirkpatrick, Frank Asche, Lori S. Benneer, J. Kevin Craig & James M. Nance, *Seafood prices reveal impacts of a major ecological disturbance*. [PNAS 114 \(2017\), 1512–1517](#).

[pnas114-01512-Supplement.xlsx](#)

Coastal hypoxia (dissolved oxygen ≤ 2 mg/L) is a growing problem worldwide that threatens marine ecosystem services, but little is known about economic effects on fisheries. Here, we provide evidence that hypoxia causes economic impacts on a major fishery. Ecological studies of hypoxia and marine fauna suggest multiple mechanisms through which hypoxia can skew a population's size distribution toward smaller individuals. These mechanisms produce sharp predictions about changes in seafood markets. Hypoxia is hypothesized to decrease the quantity of large shrimp relative to small shrimp and increase the price of large shrimp relative to small shrimp. We test these hypotheses using time series of size-based prices. Naive quantity-based models using treatment/control comparisons in hypoxic and nonhypoxic areas produce null results, but we find strong evidence of the hypothesized effects in the relative prices: Hypoxia increases the relative price of large shrimp compared with small shrimp. The effects of fuel prices provide supporting evidence. Empirical models of fishing effort and bioeconomic simulations explain

why quantifying effects of hypoxia on fisheries using quantity data has been inconclusive. Specifically, spatial-dynamic feedbacks across the natural system (the fish stock) and human system (the mobile fishing fleet) confound “treated” and “control” areas. Consequently, analyses of price data, which rely on a market counterfactual, are able to reveal effects of the ecological disturbance that are obscured in quantity data. Our results are an important step toward quantifying the economic value of reduced upstream nutrient loading in the Mississippi Basin and are broadly applicable to other coupled human-natural systems.

Keywords: hypoxia | fisheries | coupled human-natural systems | bioeconomics | spatial dynamics

Significance: Coastal hypoxia is a growing problem worldwide, but economic consequences for fisheries are largely unknown. We provide evidence that hypoxia causes economic effects on a major fishery that was once the most valuable fishery in America. Our analysis is also a breakthrough in causal inference for coupled human-natural systems. Although establishing causality with observational data is always challenging, feedbacks across the human and natural systems amplify these challenges and explain why linking hypoxia to fishery losses has been elusive. We offer an alternative approach using a market counterfactual that is immune to contamination from feedbacks in the coupled system. Natural resource prices can thus be a means to assess the significance of an ecological disturbance.

Anthropologie

JONES 2017

Eppie R. Jones et al., *The Neolithic Transition in the Baltic Was Not Driven by Admixture with Early European Farmers*. [Current Biology \(2017\), preprint, 1–7. DOI:10.1016/j.cub.2016.12.060.](#)

Eppie R. Jones, Gunita Zarina, Vyacheslav Moiseyev, Emma Lightfoot, Philip R. Nigst, Andrea Manica, Ron Pinhasi, & Daniel G. Bradley

In Brief: Jones et al. present genome-wide data spanning the Mesolithic-Neolithic transition in Latvia and Ukraine that show that massive migration of Anatolian farmers was not a universal driver for the spread of Neolithic lifeways and possibly Indo-European languages throughout Europe.

Highlights:

- A degree of genetic continuity from the Mesolithic to the Neolithic in the Baltic
- Steppe-related genetic influences found in the Baltic during the Neolithic
- No Anatolian farmer-related genetic admixture in Neolithic Baltic samples
- Steppe ancestry in Latvia at the time of the emergence of Balto-Slavic languages

The Neolithic transition was a dynamic time in European prehistory of cultural, social, and technological change. Although this period has been well explored in central Europe using ancient nuclear DNA [1, 2], its genetic impact on northern and eastern parts of this continent has not been as extensively studied. To broaden our understanding of the Neolithic transition across Europe, we analyzed eight ancient genomes: six samples (four to .1- to 4-fold coverage) from a 3,500 year temporal transect ($\approx 8,300$ – $4,800$ calibrated years before present) through the Baltic region dating from the Mesolithic to the Late Neolithic and two samples spanning the Mesolithic-Neolithic boundary from the Dnieper Rapids region of Ukraine. We find evidence that some huntergatherer ancestry persisted across the Neolithic transition in both regions. However, we also find signals consistent with influxes of non-local people, most likely from northern Eurasia and the Pontic Steppe. During the Late Neolithic, this Steppe-related impact coincides with the proposed emergence of Indo-European languages in the Baltic region [3, 4]. These influences are

distinct from the early farmer admixture that transformed the genetic landscape of central Europe, suggesting that changes associated with the Neolithic package in the Baltic were not driven by the same Anatoliansourced genetic exchange.

ROBERTS 2016

Patrick Roberts, Nicole Boivin, Julia Lee-Thorp, Michael Petraglia & Jay Stock, *Tropical Forests and the Genus Homo*. [Evolutionary Anthropology](#) **25** (2016), 306–317.

Tropical forests constitute some of the most diverse and complex terrestrial ecosystems on the planet. From the Miocene onward, they have acted as a backdrop to the ongoing evolution of our closest living relatives, the great apes, and provided the cradle for the emergence of early hominins, who retained arboreal physiological adaptations at least into the Late Pliocene. There also now exists growing evidence, from the Late Pleistocene onward, for tool-assisted intensification of tropical forest occupation and resource extraction by our own species, *Homo sapiens*. However, between the Late Pliocene and Late Pleistocene there is an apparent gap in clear and convincing evidence for the use of tropical forests by hominins, including early members of our own genus. In discussions of Late Pliocene and Early Pleistocene hominin evolution, including the emergence and later expansion of *Homo* species across the globe, tropical forest adaptations tend to be eclipsed by open, savanna environments. Thus far, it is not clear whether this Early-Middle Pleistocene lacuna in *Homo*-rainforest interaction is real and representative of an adaptive shift with the emergence of our species or if it is simply reflective of preservation bias.

Archäologie

DANI 2016

János Dani, Klára P. Fischl, Gabriella Kulcsár, Vajk Szeverényi & Viktória Kiss, *Visible and invisible inequality, Changing patterns of wealth consumption in early and middle Bronze age Hungary*. In: HARALD MELLER, HANS PETER HAHN, REINHARD JUNG & ROBERTO RISCH (Hrsg.), *Arm und Reich – Zur Ressourcenverteilung in prähistorischen Gesellschaften, 8. Mitteldeutscher Archäologentag vom 22. bis 24. Oktober 2015 in Halle (Saale)*. ([Halle 2016](#)), 219–241.

The Bronze Age in Hungary witnessed significant social transformations in the Carpathian Basin and more specifically in Hungary. The aim of this paper is to present the visible and invisible traces of social inequalities through several EBA and MBA case studies from Hungary: the investigation of the system of multiple tiered settlement networks, the differentiation of social status manifested in burial rites, and the study of the deposition of metal objects in hoards. Based on the analyses of the above-mentioned factors the authors seek answers to the questions of how inequality emerged, what kind of elites can be envisaged in this period, and what kinds of regional differences can be observed in this respect in Bronze Age Hungary.

Im Karpatenbecken allgemein und in Ungarn im Speziellen fanden in der Bronzezeit wesentliche soziale Veränderungen statt. Im vorliegenden Beitrag sollen anhand verschiedener früh- und mittelbronzezeitlicher Fallstudien die sichtbaren und unsichtbaren Spuren sozialer Ungleichheit vorgestellt werden: die Analyse mehrstufiger Siedlungsnetzwerke, die Unterscheidung des Sozialstatus, der sich in

den Grabsitten manifestiert, und die Untersuchung der Niederlegung von Metallobjekten in Hortfunden. Die Auswertung der genannten Faktoren soll Antworten auf die Frage nach dem Aufkommen von Ungleichheit, der Art der in dieser Zeit existierenden Eliten und der diesbezüglichen regionalen Unterschiede im bronzezeitlichen Ungarn liefern.

EGGERT 2011

Manfred Eggert, *Retrospektive, Archäologie in kulturwissenschaftlicher Sicht*. (Münster 2011).

LICHTER 2010

CLEMENS LICHTER (Hrsg.), *Jungsteinzeit im Umbruch – Die „Michelsberger Kultur“ und Mitteleuropa vor 6000 Jahren, Katalog zur Ausstellung im Badischen Landesmuseum Schloss Karlsruhe 20. 11. 2010 – 15. 5. 2011*. (Darmstadt 2010).

MELLER 2016

HARALD MELLER, HANS PETER HAHN, REINHARD JUNG & ROBERTO RISCH (Hrsg.), *Arm und Reich – Zur Ressourcenverteilung in prähistorischen Gesellschaften, 8. Mitteldeutscher Archäologentag vom 22. bis 24. Oktober 2015 in Halle (Saale)*. ([Halle 2016](#)).

Bibel

DEIST 1986

F. E. Deist, *David: A Man After God's Heart? An investigation into the David character in the so-called Succession Narrative*. In: W. C. VAN WYK (Hrsg.), *Studies in the Succession Narrative*. Oud-Testamentiese Werkgemeenskap in Suid-Afrika 27/28 ([Pretoria 1986](#)), 99–129.

An investigation into the David character in 2 Samuel 9-20; 1 Kings 1-2 based upon an analysis of the textual organisation of the story and a close reading of the text shows that, apart from a few positive traits in 2 Samuel 15-20, David is pictured as an inefficient, knavish, nepotist, unjust and rather foolish man. Yet the narrator believes Yahweh to have been active 'in, with and under' all the unwise decisions, fratricide, murder, adultery and injustice. The story shows a certain affinity with the (Yahwist strand of the) Pentateuchal narrative as well as with particular wisdom views of the world. David might have been a man after God's heart, but the David of the Succession Narrative certainly is not a king after the narrator's heart.

KLEIMAN 2016

Assaf Kleiman, Adam Kaplan & Israel Finkelstein, *Building 338 at Megiddo, New Evidence from the Field*. [Israel Exploration Journal](#) **66** (2016), 161–176.

Building 338 at Megiddo is one of the most impressive Iron Age structures unearthed in the southern Levant. Scholars have debated its function and its dating — Iron IIA or Iron IIB. In this article we present new evidence from excavations conducted in the vicinity of the building that suggests that it was constructed in the Iron IIB. We then place these results within the context of Iron II Megiddo.

Biologie

BHULLAR 2017

Bhart-Anjan S. Bhullar, *Catastrophe triggers diversification*. [nature 542 \(2017\), 304–305](#).

An analysis of more than 2,000 species of bird provides insight into how the animals' diverse beak shapes evolved, and points to a single rare event as a trigger for the rapid initial divergence of avian lineages.

The researchers predicted that their data would be consistent with the concept of quantum evolution — the idea that an initial radiation involves rapid divergence into new forms and functions⁴. For instance, such rapid divergence occurred during the Cambrian explosion of lineages of animals that have bodies showing bilateral symmetry, which began about 541 million years ago and lasted for 20 million to 25 million years⁵. Under this model, rates of beak-shape diversification would be fastest during the initial avian radiation⁶. Indeed, the authors found that most of the shape space filled rapidly during this initial burst. Coupled with a comprehensive study⁷ of avian relationships, which indicated that the radiation was associated with the catastrophic end-Cretaceous mass extinction 66 million years ago, these results support the idea that evolution is highly contingent on chance occurrences, marrying a Darwinian and a Cuvierian world view.

Perhaps the future is predictable only between one cataclysm and the next.

COONEY 2017

Christopher R. Cooney et al., *Mega-evolutionary dynamics of the adaptive radiation of birds*. [nature 542 \(2017\), 344–347](#).

[n542-0344-Supplement1.xlsx](#), [n542-0344-Supplement2.zip](#), [n542-0344-Supplement3.zip](#), [n542-0344-Supplement4.csv](#)

Christopher R. Cooney, Jen A. Bright, Elliot J. R. Capp, Angela M. Chira, Emma C. Hughes, Christopher J. A. Moody, Lara O. Nouri, Zoë K. Varley & Gavin H. Thomas

NAM 2017

Kiwoong Nam et al., *Evidence that the rate of strong selective sweeps increases with population size in the great apes*. [PNAS 114 \(2017\), 1613–1618](#).

Kiwoong Nam, Kasper Munch, Thomas Mailund, Alexander Nater, Maja Patricia Greminger, Michael Krützen, Tomas Marquès-Bonet & Mikkel Heide Schierup

Quantifying the number of selective sweeps and their combined effects on genomic diversity in humans and other great apes is notoriously difficult. Here we address the question using a comparative approach to contrast diversity patterns according to the distance from genes in all great ape taxa. The extent of diversity reduction near genes compared with the rest of intergenic sequences is greater in a species with larger effective population size. Also, the maximum distance from genes at which the diversity reduction is observed is larger in species with large effective population size. In Sumatran orangutans, the overall genomic diversity is $\approx 30\%$ smaller than diversity levels far from genes, whereas this reduction is only 9% in humans. We show by simulation that selection against deleterious mutations in the form of background selection is not expected to cause these differences in diversity among species. Instead, selective sweeps caused by positive selection can reduce diversity level more severely in a large population if there is a higher number of selective sweeps per unit time. We discuss what can cause such a correlation, including the possibility that more frequent sweeps in larger populations are due to a shorter waiting time for the right mutations to arise.

Keywords: selective sweep | population size | great ape | adaptive evolutionary rate | mutation limitation

Significance: The rate of genomic adaptation is determined by the rate of environmental change, the availability of beneficial mutations, and the efficiency of positive selection. The relative importance of these factors has been actively discussed. We address the questions using whole genome sequences of great apes, which have very different population sizes whereas their genomic architectures are highly similar. We infer that the impact of selection on the genomic diversity of a species increases with the effective population size, most likely due to the differential influx rate of beneficial mutations. This explanation is, among other possibilities, expected if adaptive evolution is limited by the waiting time for new favorable mutations in great apes.

Energie

LAWLER 2017

Benjamin Lawler, Derek Splitter, James Szybist & Brian Kaul, *Thermally Stratified Compression Ignition, A new advanced low temperature combustion mode with load flexibility*. [Applied Energy 189 \(2017\), 122–132](#).

A new advanced combustion mode is introduced, called Thermally Stratified Compression Ignition (TSCI), which uses direct water injection to control both the average temperature and the temperature distribution prior to ignition, thereby providing cycle-to-cycle control over the start and rate of heat release in Low Temperature Combustion (LTC). Experiments were conducted to fundamentally understand the effects of water injection on heat release in LTC. The results show that water injection retards the start of combustion due to the latent heat of vaporization of the injected water. Furthermore, for start of water injection timings between 20 and 70 degrees before top dead center, combustion is significantly elongated compared to without water injection. The 10–90 % burn duration with 6.6 and 9.0 mg of water per cycle was 77 % and 146 % longer than without water injection, respectively. Direct water injection reduces the heat release rate by local evaporative cooling that results in a forced thermal stratification. Finally, the load limits with and without water injection were determined experimentally. Without water injection, the load range was 2.3–3.6 bar gross IMEP. By using water injection to control heat release, the load range in TSCI was 2.3–8.4 bar gross IMEP, which is a range expansion of over 350 %. These results demonstrate that direct water injection can provide significant improvements to both controllability and the range of operability of LTC, thereby resolving the major challenges associated with HCCI.

Keywords: Low temperature combustion | Advanced combustion | HCCI | Heat release | Thermal stratification

Klima

BASSIS 2017

Jeremy N. Bassis, Sierra V. Petersen & L. Mac Cathles, *Heinrich events triggered by ocean forcing and modulated by isostatic adjustment*. [nature 542 \(2017\), 332–334](#).

n542-0332-Supplement1.mov, n542-0332-Supplement2.mov, n542-0332-Supplement3.mov, n542-0332-Supplement4.pdf

During the last glacial period, the Laurentide Ice Sheet sporadically discharged huge numbers of icebergs through the Hudson Strait into the North Atlantic Ocean, leaving behind distinct layers of ice-rafted debris in the ocean sediments^{1–3}. Perplexingly, these massive discharge events—Heinrich events—occurred during the cold portion of millennial-scale climate oscillations called Dansgaard–Oeschger cycles^{2,4}. This is in contrast to the expectation that ice sheets expand in colder climates and shrink in warmer climates. Here we use an ice sheet model to show that the magnitude and timing of Heinrich events can be explained by the same processes that drive the retreat of modern marine-terminating glaciers. In our model, subsurface ocean warming associated with variations in the overturning circulation increases underwater melt along the calving face, triggering rapid margin retreat and increased iceberg discharge. On millennial timescales, isostatic adjustment causes the bed to uplift, isolating the terminus from subsurface warming and allowing the ice sheet to advance again until, at its most advanced position, it is poised for another Heinrich event. This mechanism not only explains the timing and magnitude of observed Heinrich events, but also suggests that ice sheets in contact with warming oceans may be vulnerable to catastrophic collapse even with little atmospheric warming.

CHEN 2017

Nan Chen & Andrew J. Majda, *Simple stochastic dynamical models capturing the statistical diversity of El Niño Southern Oscillation.*

PNAS **114** (2017), 1468–1473.

The El Niño Southern Oscillation (ENSO) has significant impact on global climate and seasonal prediction. A simple modeling framework is developed here that automatically captures the statistical diversity of ENSO. First, a stochastic parameterization of the wind bursts including both westerly and easterly winds is coupled to a simple ocean–atmosphere model that is otherwise deterministic, linear, and stable. Second, a simple nonlinear zonal advection with no ad hoc parameterization of the background sea-surface temperature (SST) gradient and a mean easterly trade wind anomaly representing the multidecadal acceleration of the trade wind are both incorporated into the coupled model that enables anomalous warm SST in the central Pacific. Then a three-state stochastic Markov jump process is used to drive the wind burst activity that depends on the strength of the western Pacific warm pool in a simple and effective fashion. It allows the coupled model to simulate the quasi-regular moderate traditional El Niño, the super El Niño, and the central Pacific (CP) El Niño as well as the La Niña with realistic features. In addition to the anomalous SST, the Walker circulation anomalies at different ENSO phases all resemble those in nature. In particular, the coupled model succeeds in reproducing the observed episode during the 1990s, where a series of 5-y CP El Niños is followed by a super El Niño and then a La Niña. Importantly, both the variance and the non-Gaussian statistical features in different Niño regions spanning from the western to the eastern Pacific are captured by the coupled model.

Keywords: atmospheric wind bursts | nonlinear zonal advection | easterly trade wind | three-state stochastic Markov jump process | non-Gaussian statistical features

Significance: The El Niño Southern Oscillation (ENSO) has significant impact on global climate and seasonal prediction. A simple modeling framework is developed here that automatically captures the statistical diversity of ENSO. In addition to simulating different types of El Niño and La Niña with realistic features, the model succeeds in capturing both the variance and the non-Gaussian statistical properties in different Niño regions spanning the Pacific. Particularly,

the observed episode during the 1990s, where a 5-y central Pacific El Niño is followed by a super El Niño and then a La Niña, is reproduced by the model. Key features of the model are state-dependent stochastic wind bursts and nonlinear advection of seasurface temperature that allow effective transitions between different ENSO states.

STOCKER 2017

Benjamin David Stocker, Zicheng Yu, Charly Massa & Fortunat Joos, *Holocene peatland and ice-core data constraints on the timing and magnitude of CO₂ emissions from past land use*. *PNAS* **114** (2017), 1492–1497.

[pnas114-01492-Supplement.xlsx](#)

CO₂ emissions from preindustrial land-use change (LUC) are subject to large uncertainties. Although atmospheric CO₂ records suggest only a small land carbon (C) source since 5,000 y before present (5 kyBP), the concurrent C sink by peat buildup could mask large early LUC emissions. Here, we combine updated continuous peat C reconstructions with the land C balance inferred from double deconvolution analyses of atmospheric CO₂ and δ¹³C at different temporal scales to investigate the terrestrial C budget of the Holocene and the last millennium and constrain LUC emissions. LUC emissions are estimated with transient model simulations for diverging published scenarios of LU area change and shifting cultivation. Our results reveal a large terrestrial nonpeatland C source after the Mid-Holocene (66.25 PgC at 7–5 kyBP and 115 . 27 PgC at 5–3 kyBP). Despite high simulated per-capita CO₂ emissions from LUC in early phases of agricultural development, humans emerge as a driver with dominant global C cycle impacts only in the most recent three millennia. Sole anthropogenic causes for particular variations in the CO₂ record (≈20 ppm rise after 7 kyBP and ≈10 ppm fall between 1500 CE and 1600 CE) are not supported. This analysis puts a strong constraint on preindustrial vs. industrial-era LUC emissions and suggests that upper-end scenarios for the extent of agricultural expansion before 1850 CE are not compatible with the C budget thereafter.

Keywords: carbon cycle | Anthropocene | agriculture | peatland | ice core

Significance: Timing, extent, and impacts of preindustrial agricultural expansion are uncertain, yet crucial for understanding the role of humans in the Earth’s environmental history. The buildup of northern peatlands, initiated after ice-age conditions, was a major carbon sink and could have compensated large CO₂ emissions from land use, given timing matches. We present observation- and model-based reconstructions of past peatland carbon and land-use CO₂ emission estimates based on all published scenarios. Our analyses of the terrestrial carbon balance reveal a large nonpeatland land carbon source after the Mid-Holocene climate optimum, not explained by land use, and we find that previously suggested links between CO₂ and population and land-use history are not supported.

VIELI 2017

Andreas Vieli, *Pulsating ice sheet*. *nature* **542** (2017), 298–299.

During the last ice age, huge numbers of icebergs were episodically discharged from an ice sheet that covered North America. Numerical modelling suggests that these events resulted from a conceptually simple feedback cycle.

A strength of the authors’ model is that it is quantitative, physically based and includes the dominant dynamic processes and feedbacks expected for such ice sheets. Furthermore, although the model is simple, it is robust against a wide choice of model parameters.

Kultur

KIENLIN 2017

Tobias L. Kienlin, *World Systems and the Structuring Potential of Foreign-Derived (Prestige) Goods, On Modelling Bronze Age Economy and Society*. In: ANKE K. SCHOLZ, MARTIN BARTELHEIM, ROLAND HARDENBERG & JÖRN STAECKER (Hrsg.), *Resource Cultures*. Ressourcen Kulturen 5 (Tübingen 2017), 143–157.

In this paper an attempt is made to deconstruct some widely held notions in Bronze Age research that each involve bridging the gap between socially and culturally distinct societies widely set apart in space and/or in time in order to produce the unified Bronze Age narrative so widely accepted. It is argued, instead, for an approach that leaves behind essentialising concepts of ‘core’ and ‘periphery’ and allows for the variability and historicity of potentially interacting local groups – both from the Bronze Age Mediterranean and from ‘Barbarian’ Europe. It is argued, furthermore, that a narrow set of ethnographic analogies, such as the notorious Hawaiian chiefdoms, are wrongly imposed upon Bronze Age archaeology as a universal stage of social evolution, when in fact they represent an extreme and historically specific example of ‘political economy’ only.

Keywords: Bronze Age | prestige goods | economy | society | World System Theory | Europe and the Mediterranean | Postcolonial Studies

PARKINSON 2004

William A. Parkinson, Richard W. Yerkes & Attila Gyucha, *The Transition from the Neolithic to the Copper Age: Excavations at Veszto-Bikeri, Hungary, 2000-2002*. *Journal of Field Archaeology* **29** (2004), 101–121.

The transition from the Neolithic to the Copper Age on the Great Hungarian Plain (ca. 4500 B.C.) coincides with dramatic changes in house form, settlement layout, settlement distribution, and mortuary customs. These changes affected nearly every aspect of social organization—from the organization of households and villages to the distribution of cultural groups across the landscape. Our current understanding of the various changes that occurred during this important transition is hindered by a lack of systematically excavated settlement sites dating to the Early Copper Age on the Great Hungarian Plain.

The results of three years of excavation at an Early Copper Age settlement located in the Koros River Valley suggest that, in contrast to the Neolithic, craft activities on Early Copper Age sites are segregated in different parts of the settlements. This general pattern of increasing economic specialization occurs throughout SE Europe at the end of the Neolithic and is associated with a tendency towards increased integration of economic and social units in settlements during the Copper Age.

PARKINSON 2010

William A. Parkinson, Richard W. Yerkes, Attila Gyucha, Apostolos Sarris, Margaret Morris & Roderick B. Salisbury, *Early Copper Age Settlements in the Körös Region of the Great Hungarian Plain*. *Journal of Field Archaeology* **35** (2010), 164–183.

This article discusses research carried out by the Koros Regional Archaeological Project from 2000 to 2006 at Early Copper Age Tiszapolgâr Culture sites on the Great Hungarian Plain. To build a model of social organization for the period, we

incorporated information from regional geomorphological studies, soil chemistry analysis, archaeological surface surveys, remote sensing, and systematic excavations at Early Copper Age sites in the Kôros Valley of southeastern Hungary. Previous models characterized the transition from the Neolithic period to the Copper Age as an abrupt shift from a tell-based, sedentary, agricultural lifeway to one based on mobile cattle herding. By studying the transition between these periods on multiple geographic and temporal scales, we have identified a more gradual process with widespread regional variation in cultural patterns. Similar social processes characterize the transition between chronological periods and cultural phases in other parts of the world, and we suggest that a multiscale approach is effective for building comparative archaeological models of long-term social change.

Keywords: Copper Age | Fortifications | Neolithic | Surface survey | Tiszapolgár

SCHOLZ 2017

ANKE K. SCHOLZ, MARTIN BARTELHEIM, ROLAND HARDENBERG & JÖRN STAECKER (Hrsg.), *Resource Cultures*. Ressourcen Kulturen 5 (Tübingen 2017).

Metallzeiten

MANASSA 2003

Colleen Manassa, *The Great Karnak Inscription of Merneptah, Grand Strategy in the 13th Century BC*. Yale Egyptological Studies 5 (New Haven 2003).

SCHIENDORFER 2017

Reinhard Schiendorfer, *More about the decline of the Bronze Age empires*. (unpublished 2017).

By conquering Babylon Tikulti-Ninurta destroys the alliance of Hatti and Babylon, but even more important he interrupts, as a side effect or on full purpose, the tin-trading route from Uzbekistan over Susa (capital of Elam) and Babylon to Ugarit. It is very likely that Tikulti-Ninurta having the control of Babylon will not allow, that they carry on delivering tin to Ugarit. He surely accepts the loss of income, knowing that the tin embargo stops the production of new weapons in hostile Hatti.

In this context, it is important to know, that at those times there are no major tin mines in the eastern Mediterranean area, and the tin of Spain is not yet detected (or not known to the eastern kingdoms). Although most of the copper originates from Alashiya (Cyprus), there are as well some copper mines in the east. Assyria, Babylon and Elam can get the required copper e.g. in Iran, Bahrein or Oman. That's why they can continue to alloy bronze having both tin and copper at their disposal, while Hatti, and along with it the whole Mediterranean area including Egypt and Achijawa, is cut off from the tin supply.

Neolithikum

CHAPMAN 2015

John Chapman, *The Balkan Neolithic and Chalcolithic*. In: CHRIS FOWLER, JAN HARDING & DANIELA HOFMANN (Hrsg.), *The Oxford Handbook of Neolithic Europe*. (Oxford 2015), 1–21.

Balkan Neolithic and Chalcolithic communities lived in a mosaic of settings, providing a suite of complementary resources but dominated by upland regions. Four nonevolutionary phases can be distinguished in three millennia. Communities of ‘early farmers’ developed subsistence economies based largely upon Anatolian or Aegean domesticated plants and animals. Tells and flat sites showed regional variations, while other forms of material culture were found in each region. Social integration and improved farming techniques led to a higher degree of sedentism and settlement nucleation among ‘mature farmers’. Local and regional identities were marked materially by decorated wares and ritual equipment. The term ‘climax period’ refers to a period with significant material diversification and regionalization in all aspects of cultural identity, especially gold and copper metallurgy. In the ‘post-climax Chalcolithic’, different depositional strategies led to the reduction in quantity and diversity of material culture on small settlements, large corporate cemeteries, and the more frequent hoards.

Keywords: Material transformations | symbolism | personal skills | embodied skills | personhood | domestication | settlement | pottery | figurines | metallurgy | copper | gold

FOWLER 2015

CHRIS FOWLER, JAN HARDING & DANIELA HOFMANN (Hrsg.), *The Oxford Handbook of Neolithic Europe*. (Oxford 2015).

HOFMANN 2016

Daniela Hofmann, *Keep on walking, The role of migration in Linearbandkeramik life*. *Documenta Praehistorica* **43** (2016), 235–251.

Migration played a central role throughout the LBK culture. After summarising the motivations for migration in the earliest LBK, the article outlines how some of these factors remained relevant in later phases. Beyond continued west- and eastward expansion, at regional and site levels migration to better one’s social position provided an alternative to patrilineal land inheritance. The main change between the earliest and later phases is the role of material culture after migration events. Initially a means of creating long-distance connections, it later stressed difference from other groups. This process of ethnogenesis is invisible genetically. Overall, migration emerges as a salient behaviour even in ‘sedentary’ Neolithic societies.

Keywords: Linearbandkeramik (LBK) | migration | aDNA | ethnogenesis | social status

SCHIER 2015

Wolfram Schier, *Corded Ware culture, Central and Eastern Europe*.

In: CHRIS FOWLER, JAN HARDING & DANIELA HOFMANN (Hrsg.), *The Oxford Handbook of Neolithic Europe*. (Oxford 2015), 1–26.

The essay describes major movements of people and ideas in central and eastern Europe during the sixth to third millennium BC. For the sixth millennium, Neolithization itself is the main issue, the debate about which reflects changing attitudes in central European archaeology over the past two decades. The spread of a solar-cosmological ideology is suggested at the beginning of the fifth millennium, manifested in circular enclosures with astronomical orientations. In the late fifth and early fourth millennium the Neolithic economy and areas of habitation are considerably enlarged in central Europe, suggesting new agricultural techniques. The later fourth and early third millennium was a time of far-reaching innovation

with the development of wheeled transport; in contrast to earlier opinions an origin in the Pontic steppe zone seems highly probable. The latest large-scale movement of ideas and/or people considered here is the diffusion of the Corded Ware culture, and with it, a new gender-specific ideology, reflected in its rigid burial customs.

Keywords: Neolithization | solar calendar | circular enclosures | diversification of habitats | wheeled transport

WHITTLE 2015

Alasdair Whittle, *Unexpected Histories? South-East and Central Europe*. In: CHRIS FOWLER, JAN HARDING & DANIELA HOFMANN (Hrsg.), *The Oxford Handbook of Neolithic Europe*. (Oxford 2015), 1–27.

My brief is to review other chapters on south-east and central Europe. I concentrate on four connected themes: beginnings; the character of settlement and agricultural economy; the nature of society; and the kinds of Neolithic history that we can now attempt to write. New genetic evidence may support again the arguments for colonization, but beginnings may have involved people of varied backgrounds. Living well together continues as a theme in established Neolithic settlement, but plenty of evidence for internal difference is emerging. Models suggesting steady intensification of the agricultural economy are probably flawed, and production may have remained based on the ‘domestic mode of production’. Communities can be seen as both unified and differentiated; tensions may have existed between competing values. The ending of tell settlements in south-east Europe could be related to such factors. Future research needs to engage with the integration of different scales of analysis, not least of chronology.

Keywords: Community | integration | difference | tensions | histories