Liste erstellt am 2014-11-09

References

Altpaläolithikum

Shimelmitz 2014

Ron Shimelmitz, Steven L. Kuhn, Arthur J. Jelinek, Avraham Ronen, Amy E. Clark & Mina Weinstein-Evron, *'Fire at will', The emergence of habitual fire use 350,000 years ago.* Journal of Human Evolution (2014), preprint, 1–8. DOI:10.1016/j.jhevol.2014.07.005.

The use of fire is central to human survival and to the processes of becoming human. The earliest evidence for hominin use of fire dates to more than a million years ago. However, only when fire use became a regular part of human behavioral adaptations could its benefits be fully realized and its evolutionary consequences fully expressed. It remains an open question when the use of fire shifted from occasional and opportunistic to habitual and planned. Understanding the time frame of this 'technological mutation' will help explain aspects of our anatomical evolution and encephalization over the last million years. It will also provide an important perspective on hominin dispersals out of Africa and the colonization of temperate environments, as well as the origins of social developments such as the formation of provisioned base camps. Frequencies of burnt flints from a 16-m-deep sequence of archaeological deposits at Tabun Cave, Israel, together with data from the broader Levantine archaeological record, demonstrate that regular or habitual fire use developed in the region between 350,000–320,000 years ago. While hominins may have used fire occasionally, perhaps opportunistically, for some million years, we argue here that it only became a consistent element in behavioral adaptations during the second part of the Middle Pleistocene.

Keywords: Habitual fire | Lower Paleolithic | Acheulo-Yabrudian | Tabun Cave | Mount Carmel

Anthropologie

Brosnan 2014

Sarah F. Brosnan & Frans B. M. de Waal, *Evolution of responses to (un)fairness.* science **346** (2014), 314, E1–E7.

The human sense of fairness is an evolutionary puzzle. To study this, we can look to other species, in which this can be translated empirically into responses to reward distribution. Passive and active protest against receiving less than a partner for the same task is widespread in species that cooperate outside kinship and mating bonds. There is less evidence that nonhuman species seek to equalize outcomes to their own detriment, yet the latter has been documented in our closest relatives, the apes. This reaction probably reflects an attempt to forestall partner dissatisfaction with obtained outcomes and its negative impact on future cooperation.We hypothesize that it is the evolution of this response that allowed the development of a complete sense of fairness in humans, which aims not at equality for its own sake but for the sake of continued cooperation.

Gordon 2014

David S. Gordon, Joah R. Madden & Stephen E. G. Lea, *Both Loved and Feared: Third Party Punishers Are Viewed as Formidable and Likeable, but These Reputational Benefits May Only Be Open to Dominant Individuals*. PLoS ONE **9** (2014), e110045. DOI:10.1371/journal.pone.0110045.

Third party punishment can be evolutionarily stable if there is heterogeneity in the cost of punishment or if punishers receive a reputational benefit from their actions. A dominant position might allow some individuals to punish at a lower cost than others and by doing so access these reputational benefits. Three vignette-based studies measured participants' judgements of a third party punisher in comparison to those exhibiting other aggressive/dominant behaviours (Study 1), when there was variation in the success of punishment (Study 2), and variation in the status of the punisher and the type of punishment used (Study 3). Third party punishers were judged to be more likeable than (but equally dominant as) those who engaged in other types of dominant behaviour (Study 1), were judged to be equally likeable and dominant whether their intervention succeeded or failed (Study 2), and participants believed that only a dominant punisher could intervene successfully (regardless of whether punishment was violent or non-violent) and that subordinate punishers would face a higher risk of retaliation (Study 3). The results suggest that dominance can dramatically reduce the cost of punishment, and that while individuals can gain a great deal of reputational benefit from engaging in third party punishment, these benefits are only open to dominant individuals. Taking the status of punishers into account may therefore help explain the evolution of third party punishment.

Stock 2005

J. T. Stock, S. K. Pfeiffer, M. Chazan & J. Janetski, *F-81 Skeleton from Wadi Mataha, Jordan, and its Bearing on Human Variability in the Epipaleolithic of the Levant*. American Journal of Physical Anthropology **128** (2005), 453–465.

The discovery of a Middle Epipaleolithic adult skeleton (F-81) at the site of Wadi Mataha in southern Jordan provides new insights into human variability in the Epipaleolithic of the Levant. This paper analyzes the skeletal morphology of Wadi Mataha F-81 in the context of other Epipaleolithic remains from Jordan and Israel to assess the current evidence for morphological variability throughout this period. The F-81 skeleton shares morphological features with earlier Epipaleolithic skeletons from Ohalo and Nahal Ein Gev, and later Natufian populations. Despite the morphological similarities, F-81 extends the range of known variability prior to the Natufian with its unusually small stature and unique combination of morphological characteristics. High levels of cranial and postcranial robusticity suggest that the F-81 individual was physically active and terrestrially mobile. Pronounced bilateral asymmetry in the upper limb suggests significant lateralization of habitual activity. In the context of Epipaleolithic remains, the F-81 skeleton provides preliminary evidence for greater morphological variability, terrestrial mobility, and lateralized habitual behavior prior to the Natufian, and skeletal gracilization between the Middle and Late Epipaleolithic in the Levant.

Keywords: Geometric Kebaran; Natufian; osteometrics; robusticity; cranial variation

Bibel

Faust 2013

Avraham Faust, *The Shephelah in the Iron Age, A New Look on the Settlement of Judah.* Palestine Exploration Quarterly **145** (2013), 203–219.

The Shephelah was densely settled in the Late Bronze Age, but most of the settlements were gradually abandoned during the transition to the Iron I period. Only a few Iron I settlements existed in the eastern part of the region (excluding the Philistine sites at the northwestern edge of the Shephelah), forming a small Canaanite enclave. During the Iron II period the region was gradually resettled, and it became part of Judah. This process lasted until the 8th century BCE, when the region reached an unparalleled demographic peak. Sennacherib's campaign brought wide-scale destruction, and the region recovered only partially before being devastated by Nebuchadnezzar. After reconstructing the region's settlement history, the article reassesses its political and demographic history in comparison to the neighbouring regions of the Judean highlands and the southern coastal plain, it is concluded that the Shephelah had a lesser role in the history of Judah than some recent studies suggest.

Keywords: Shephelah, Judah, Iron Age settlement, Canaanites

Biologie

Hillman 1990

Gordon C. Hillman & M. Stuart Davies, *Domestication rates in wild-type wheats and barley under primitive cultivation.* Biological Journal of the Linnean Society **39** (1990), 39–78.

Man's first cereal crops were sown from seed gathered from wild stands, and it was in the course of cultivation that domestication occurred. This paper prcsents thr preliminary rrsults of an experimcntal approach to thc measurement of domestication rate in crops of wild-type einkorn wheat exposed to primitive systems of husbandry. The results indicate that in wild-type crops of einkorn, emmer and barley (a) domestication will have occurred only if they were harvested in a partially ripe (or near-ripe) state using specific harvesting methods; (b) exposure to shifting cultivation may also have been required in somr cases; and (c) given these requirements, the crops could have become completely domcsticatrd within two centuries, and maybr in as littlr as 20-30 years without any form of conscious selection.

This paper (1) considers the possible lrngth of delays in the start of domestication due to early crops of wild-type cereals lacking domestic-type mutants; (2) examines the combination of primitive husbandry practices that would have been necessary for any selective advantage to have been unconsciously conferred on these mutants; (3) considers the state of ripeness (at harvest) necessary for crops to be able to respond to these selective prcssures; (4) outlines field measurements of the selective intensities (selection coefficients) which arise when analogous husbandry practices are applied experimentally to living wild-type crops; (5) summarizes the essential features of a mathrmatical model which inrorporatcs thcsr mcasurrments of selection coefficients and other key variables, and which describes the rate of inrreasc in domestic-type mutants that would have occurred in early populations of wild-type cereals under specific combinations of primitivc husbandry practices; (6) considers why very early cultivators should have used that combination of

husbandry methods which, we suggest, unconsciously brought about the domestication of wild wheats and barley; and (7) concludes by considering whether these events arc likely to havc left recognizable tracrs in archaeological remains.

Keywords: Domestication rate – agricultural origins – einkorn wheat – emmer wheat – barley – selection pressures – archaeobotany.

Özkan 2002

H. Özkan, A. Brandolini, R. Schäfer-Pregl & F. Salamini, *AFLP Analysis of a Collection of Tetraploid Wheats Indicates the Origin of Emmer and Hard Wheat Domestication in Southeast Turkey*. Molecular Biology and Evolution **19** (2002), 1797–1801.

Salamini 2002

Francesco Salamini, Hakan Özkan, Andrea Brandolini, Ralf Schäfer-Pregl & William Martin, *Genetics and geography of wild cereal domestication in the Near East*. Nature Reviews Genetics **3** (2002), 429–441.

About 12,000 years ago, humans began the transition from hunter-gathering to a sedentary, agriculture-based society. From its origins in the Near East, farming expanded throughout Europe, Asia and Africa, together with various domesticated plants and animals. Where, how and why agriculture originated is still debated. But newer findings, on the basis of genome-wide measures of genetic similarity, have traced the origins of some domesticated cereals to wild populations of naturally occurring grasses that persist in the Near East. A better understanding of the genetic differences between wild grasses and domesticated crops adds important facets to the continuing debate on the origin of Western agriculture and the societies to which it gave rise.

Willcox 2005

George Willcox, *The distribution, natural habitats and availability of wild cereals in relation to their domestication in the Near East, Multiple events, multiple centres*. Vegetation History and Archaeobotany **14** (2005), 534–541.

In this article we examine the natural habitats and distribution of the six wild cereals: Triticum urartu (wild urartu wheat), T. boeoticum aegilopoides (single-grained wild einkorn), T. boeoticum thaoudar (twograined wild einkorn), T. dicoccoides (wild emmer wheat), Secale spp. (wild ryes) and Hordeum spontaneum (wild barley). A comparison of late Pleistocene/early Holocene archaeobotanical assemblages in the Near East with present-day distributions of wild cereals shows a good correlation. The regional variation in the archaeobotanical cereal assemblages and the ensuing domestication provide evidence that different cereal species were domesticated independently in different areas. Some sites were not situated near wild cereal habitats and a few were located outside the limits of distribution, even accounting for moister climatic conditions. I argue here that current models which try to explain the shift to farming have tended to over-emphasize the effect of the Younger Dryas climatic change. First, it would have had only a minor effect on cereal availability. Secondly, agriculture appears to have been established after the Younger Dryas. Thirdly, there is no evidence for a single centre of origin; agriculture arose in widely separated geographic and climatic regions. And fourthly, agriculture depends on stable climatic conditions which were not established until after the Younger Dryas.

Keywords: Wild cereals | Habitats | Domestication | Near East | Neolithic

Willcox 2012

George Willcox, *Searching for the origins of arable weeds in the Near East*. Vegetation History and Archaeobotany **21** (2012), 163–167.

This short note adds to earlier attempts at identifying arable weeds on late Pleistocene/early Holocene sites in the Near East. Nineteen potential arable weed taxa that have no known use were selected. The occurrence of these taxa at sites with morphologically wild cereals was compared to sites with morphologically domestic cereals. The presumed arable weed taxa were as common on three PPNA (Pre Pottery Neolithic A) sites without domestication as they were on Middle PPNB (Pre Pottery Neolithic B) sites with domestication, which lends support to arguments for pre-domestic cultivation at the former sites. Arable weed taxa were less common at Natufian sites but their presence raises the question of whether they originated in cultivated fields or were the ancestors of weeds gathered accidentally alongside wild cereals in their natural habitat.

Keywords: Weeds | Origins | Near East | Pre-domestic cultivation | Domestication | Agriculture

Datierung

Moore 1986

A. M. T. Moore, J. A. J. Gowlett, R. E. M. Hedges, G. C. Hillman, A. J. Legged & P. A. Rowley-Conwy, *Radiocarbon accelerator (AMS) dates for the Epipaleolithic settlement at Abu Hureyra, Syria*. Radiocarbon **28** (1986), 1068–1076.

The prehistoric settlement of Abu Hureyra in Syria was occupied in both the Epipaleolithic and Neolithic periods. It has provided significant evidence for changes in economy at the time of the inception of agriculture in southwest Asia. Twenty accelerator mass spectrometry (AMS) dates have been obtained to determine the duration of occupation of the Epipaleolithic settlement there and the precise age of samples of cereal grains and animal bones found within it. The results have demonstrated that the AMS technique can answer such questions because it dates exceedingly small samples with high precision. The dates indicate that the Epipaleolithic settlement was inhabited for about a millennium, from before 11,000 to nearly 10,000 BP, significantly longer than had been anticipated from study of the artifacts.

Pons-Branchu 2014

Edwige Pons-Branchu et al., *Uranium-series dating of carbonate formations overlying Paleolithic art, Interest and limitations*. Bulletin de la Société préhistorique française **111** (2014), 211–224.

Edwige Pons-Branchu, Raphaëlle Bourrillon, Margaret W. Conkey, Michel Fontugne, Carole Fritz, Diego Gárate, Anita Quiles, Olivia Rivero, Georges Sauvet, Gilles Tosello, Hélène Valladas and Randall White

Abstract: The Uranium-Thorium (U/Th) series dating method, developed 50 years ago, has proven its usefulness and reliability for the dating of marine (corals) and continental (speleothems) secondary carbonates deposits. Recently, improvements of the analytical techniques (TIMS – Thermo-Ionization Mass Spectrometry, and then MC-ICPMS – Multicollector-Inductively Coupled Plasma Mass Spectroscopy and laser ablation) allow the dating of very small samples and increase the potential of this method.

Given the dificulties of dating cave art (other than drawings created with charcoal, which can be directly dated by 14C), indirect dating methods have been sought. During the last decade, several publications have reported the dating by the U/Th method of thin layers of calcite overlying Paleolithic paintings and engravings or the support of these representations. In these cases, the age of calcite formation is assumed to provide a minimum age (terminus ante quem) for the underlying paintings or engravings or a maximum age (terminus post quem) when it is the support that is dated. The current article describes the relevance and potential of this method when applied to the dating of calcitic layers deposited above or below prehistoric drawings, together with the speciic dificulties encountered in U/Th dating of such thin deposits. An initial dificulty is that thorium may be present in the calcite from the beginning (detritic thorium), making age corrections necessary.

Another dificulty is that in the humid conditions prevalent in caves, the walls may have been subject to runoff over time. In this case, thin calcite layers covering paintings or engravings may have been altered, with possible chemical exchange between the water and the calcite. The most probable effect of this 'open system' behavior is the leaching of uranium, leading to an overestimation of the age of the calcite. Recent applications of the U/Th method to the dating of rock art have shown that this phenomenon, if not correctly identiied by means of independent methods, may become a signiicant source of error. For this reason, it is important to know the concentrations of uranium in each calcitic sample, as this makes it possible to detect local anomalies that have led to a substantial loss of this element. In a recent paper concerning the U/Th dating of eleven Paleolithic decorated caves in the Cantabrian Region (Spain), extremely early dates were determined (more than 41,000 years in one case) and the authors speculated that certain representations could have been produced by Neanderthals. However as detailed analytical data (uranium content) have not been published one cannot appreciate the reliability of the ages obtained. Then, in the absence of conirmation by an independent dating method, it is premature to base an archaeological reasoning on these dates.

This article emphasizes the necessity of carrying out several analyses on the same sample, and when possible on several layers from its thickness. Moreover it is important to perform cross dating using U/Th and 14C (or even using other elements such as 226Ra or 231Pa) in order to verify the consistency of the results. Several recent examples will illustrate this necessity. It should be also recalled that the calibration curves used to correct radiocarbon ages are largely based on the simultaneous dating by U/Th and 14C of the same samples of speleothems and corals.

Finally, it has to be mentioned that when the deposits underlying paintings or engravings are studied, the data obtained could be distant in time from the creative act. In fact, the growth of calcite is controlled by environmental factors and is favored during temperate and humid periods. Thus, a large number of calcitic layers overlying paintings could have been deposited during the Holocene. They could also have grown during a brief warming of the last glacial period, or represent a mean age between several growing periods. Nevertheless, these chronological data could bring relevant information, once their validity has been veriied.

Keywords: U-Th dating, calcite, cave art, Upper Paleolithic, Cantabrian region.

Energie

Elshkaki 2014

Ayman Elshkaki & T. E. Graedel, *Dysprosium, the balance problem, and wind power technology*. Applied Energy **136** (2014), 548–559.

Wind power technology is one of the cleanest electricity generation technologies that are expected to have a substantial share in the future electricity mix. Nonetheless, the expected increase in the market share of wind technology has led to an increasing concern of the availability, production capacity and geographical concentration of the metals required for the technology, especially the rear earth elements (REE) neodymium (Nd) and the far less abundant dysprosium (Dy), and the impacts associated with their production. Moreover, Nd and Dy are coproduced with other rare earth metals mainly from iron, titanium, zirconium, and thorium deposits. Consequently, an increase in the demand for Nd and Dy in wind power technology and in their traditional applications may lead to an increase in the production of the host metals and other companion REE, with possible implications on their supply and demand. In this regard, we have used a dynamic material flow and stock model to study the impacts of the increasing demand for Nd and Dy on the supply and demand of the host metals and other companion REE. In one scenario, when the supply of Dy is covered by all current and expected producing deposits, the increase in the demand for Dy leads to an oversupply of 255 Gg of total REE and an oversupply of the coproduced REE Nd, La, Ce and Y. In the second and third scenarios, however, when the supply of Dy is covered by critical REE rich deposits or Dy rich deposits, the increase in Dy demand results in an oversupply of Ce and Y only, while the demand for Nd and La exceeds their supply. In the case of an oversupply of REEs, the environmental impacts associated with the REEs production should be allocated to Dy and consequently to the technologies that utilize the metal. The results also show that very large quantities of thorium will be co-produced as a result of the demand for Dy. The thorium would need to be carefully disposed of, or significant thorium applications would need to be found.

Keywords: Wind power technology | Rare earth elements | Dynamic material flow analysis | Companion metals

Hong 2014

Sanghyun Hong, Corey J. A. Bradshaw & Barry W. Brook, *Nuclear power can reduce emissions and maintain a strong economy, Rating Australia's optimal future electricity-generation mix by technologies and policies*. Applied Energy **136** (2014), 712–725.

Legal barriers currently prohibit nuclear power for electricity generation in Australia. For this reason, published future electricity scenarios aimed at policy makers for this country have not seriously considered a full mix of energy options. Here we addressed this deficiency by comparing the life-cycle sustainability of published scenarios using multi-criteria decision-making analysis, and modeling the optimized future electricity mix using a genetic algorithm. The published 'CSIRO e-future' scenario under its default condition (excluding nuclear) has the largest aggregate negative environmental and economic outcomes (score = 4.51 out of 8), followed by the Australian Energy Market Operator's 100 % renewable energy scenario (4.16) and the Greenpeace scenario (3.97). The e-future projection with maximum nuclear-power penetration allowed yields the lowest negative impacts (1.46). After modeling possible future electricity mixes including or excluding nuclear power, the weighted criteria recommended an optimized scenario mix

where nuclear power generated >40 % of total electricity. The life-cycle greenhouse-gas emissions of the optimization scenarios including nuclear power were <27 kg CO2— MWh-1 in 2050, which achieves the IPCC's target of 50–150 kg CO2— MWh-1. Our analyses demonstrate clearly that nuclear power is an effective and logical option for the environmental and economic sustainability of a future electricity network in Australia.

Keywords: Future electricity mix | Genetic algorithm | Nuclear power | Renewable energy | Decarbonization

Kroniger 2014

Daniel Kroniger & Reinhard Madlener, *Hydrogen storage for wind parks, A real options evaluation for an optimal investment in more flexibility.* Applied Energy **136** (2014), 931–946.

In this paper, we investigate the economic viability of hydrogen storage for excess electricity produced in wind power plants. For the analysis, we define two scenarios (50 MW system with and without re-electrification unit) and apply Monte Carlo simulation and real options analysis (ROA) to compute hourly profits under uncertainty regarding wind speed, spot market electricity prices, and call of minute reserve capacity. Hydrogen as a storage medium helps to either (1) increase capacity utilization of the wind park in case of grid disconnection; (2) to offer minute reserve; or (3) to exploit temporal price arbitrage at the electricity spot market; additionally, hydrogen can also be directly sold as a commodity. We find that power-to-power operation is highly uneconomical under current framework conditions in Germany, irrespective of potential energy efficiency gains. Interestingly, due to counterbalancing effects, offshore wind parks are found to have only a modest economic advantage compared to onshore ones. The power-to-fuel plant can be operated profitably (at hydrogen prices of more than 0.36 E m-3 and a 100 % utilization of the electrolyzer) if hydrogen is directly marketed instead of used to store and re-generate electrical energy. The ROA recommends investment in a storage device without re-electrification unit beyond an expected project value that is about twice the investment cost of the storage device, a figure which is reduced markedly as conversion efficiency rises, assuming technical change to come at no cost for the investor, i.e. as being exogenous.

Keywords: Wind power | Hydrogen storage | Real options analysis | Optimal investment decision-making

Nian 2014

Victor Nian & S. K. Chou, *The state of nuclear power two years after Fukushima – The ASEAN perspective.* Applied Energy **136** (2014), 838–848.

Given the need to rein in the rise in the global average temperature, decarbonizing the electricity sector, which accounts for nearly 50 % of global greenhouse gas (GHG) emissions, is crucial. The suitability of nuclear power as a base-load technology and its relatively negligible GHG emissions raised expectations of a nuclear renaissance, until the Fukushima disaster brought discussions about nuclear power's potential to a standstill. However, completely ruling out nuclear may not be sustainable owing to the realities of rising energy demand, climate change considerations, and the need for reliable base-load supply technology, especially in the case of fast growing economies in the Association of South East Asian Nations (ASEAN). The Fukushima disaster was a wake-up call for both governments and the nuclear industry. Led by the International Atomic Energy Agency, the more advanced economies conducted stringent reviews of safety standards and emergency response procedures in the event of a catastrophe. Meanwhile the industry

responded with strong commitments towards “Fukushima proof” designs, alongside other advancements towards “safer” fission power. In the ASEAN context, we argue in this paper that in addition to the economic advantage, nuclear power can help address the twin objectives of energy security and mitigating climate change effects. In ASEAN, there is still a strong momentum towards nuclear power development due to strategic considerations. In this paper, we reviewed in a holistic approach the various factors influencing decision making on nuclear power. Using ASEAN as a case study, we argue that nuclear power remains an important option and should be taken up rapidly if decarbonizing electricity generation is a grave concern. We also provide some recommendations towards the “safer nuclear” for ASEAN at the end of this paper.

Keywords: Nuclear | Energy security | Climate change | Base-load electricity | Fukushima | Southeast Asia

Wang 2014

Shuofeng Wang, Changwei Ji, Bo Zhang & Xiaolong Liu, *Lean burn performance of a hydrogen-blended gasoline engine at the wide open throttle condition*. Applied Energy **136** (2014), 43–50.

The performance of a hydrogen-blended gasoline engine at lean and the wide open throttle conditions was investigated. A hydrogen port-injection system was adopted to introduce the hydrogen into each cylinder. The engine was operated at 1400 rpm and two hydrogen blending levels of 0 % and 3 %. The excess air ratio was raised from 1.00 to about 1.45 for a given hydrogen addition fraction. The test results demonstrated that the hydrogen blending contributed to the raised thermal efficiency and shortened flame development and propagation durations. An increased brake mean effective pressure was found after the hydrogen addition only at lean conditions. For both stoichiometric and lean conditions, the hydrogen blending was beneficial for reducing the engine cyclic variation. This provides a possibility to run a hydrogen-blended gasoline engine with the fully opened throttle position and control the engine torque only by adjusting the excess air ratio. Toxic emissions including HC, CO and particulate were reduced after the hydrogen blending.

Keywords: Hydrogen | Gasoline | Lean burning | Emissions | Wide open throttle

Grabung

Bridault 2011

Anne Bridault, Rivka Rabinovich & Tal Simmons, *Human activities, site location and taphonomic process, A relevant combination for understanding the fauna of Eynan (Ain Mallaha), level Ib (final Natufian, Israel)*. In: Emmanuelle Vila, Lionel Gourichon, Alice M. Choyke & Hijlke Buitenhuis (Hrsg.), *Proceedings of the eighth international Symposium on the Archaeozoology of southwestern Asia and adjacent areas, Lyon, June 28th–July 1st, 2006*. Travaux de la Maison de l’Orient et de la Méditerranée 49 (Lyon 2011), 99–117.

Recent excavations conducted by F. Valla and H. Khalaily at Eynan/Ain Mallaha, located in the Upper Jordan Valley, have since 1996, concentrated on the Final Natfian Layer. Numerous faunal remains were collected from the occuption floors of the features and from structures. An analysis of several samples from the

upper layer is presented here. General questions regarding the nature of the nature of the Natufian economy, the modes of occupation and the habitats exploited by these people have ben addressed. A detailed presentation of the material has also been provided and the frequencies of species discussed. Finally, we have tried to reconstruct the origin of the fauna, its characteristics and its impact on the human inhabitants of Eynan.

Keywords: zooarchaeology, broad spectrum, subsistance, Final Natufian, Near East, Israel

KUIJT 2004

Ian Kuijt, *Pre-Pottery Neolithic A and Late Natufian at 'Iraq ed-Dubb, Jordan.* Journal of Field Archaeology **29** (2004), 291–308.

Excavations at the cave of 'Iraq ed-Dubb, Jordan, help clarify our understanding of the transition from foraging to farming in the Near East. The people who occupied the site in the Late Natufian period (13,500-11,500 B.) were a relatively mobile group who used the cave as a temporary base camp for local foraging and hunting. In contrast, the occupants in the Pre-Pottery Neolithic A period (11,500-10,500 B.P) constructed at least two stone residences, with food processing features, inside the cave. This study provides a detailed consideration of the timing of the earliest sedentary farmers at 'Iraq ed-Dubb, and elucidates the nature of differences in architecture between these periods, reflecting upon the implications of the transition to food production, which appears to have taken place less rapidly than previously assumed.

MACDONALD 2007

Danielle Macdonald, *Debitage Analysis of 'Uyun al-Hammâm, The Reconstruction of Epipalaeolithic Reduction Sequences.* MA thesis, University of Victoria (Victoria 2007).

The transition from a hunter-gatherer way of life to sedentary food-producing societies was a pivotal shift in human prehistory, affecting social, political, economic and ideological structures. The Epipalaeolithic in the Levant precedes the "origins of agriculture" and is the key to understanding the beginnings of social and economic phenomena seen in the later periods. Excavations at the site 'Uyun al-Hammâm, located in northern Jordan, has uncovered a large amount of lithic material, faunal remains, and several human burials suggesting this site was a place of importance on the Epipalaeolithic landscape. This thesis explores the lithic debitage from 'Uyun alHammâm to determine the stages of reduction that are represented in the assemblage. Debitage analysis, in conjunction with other site data, contributes to a robust understanding of the site's unique function during the Epipalaeolithic.

MAHER 2005

Lisa Ann Maher, *The Epipalaeolithic in Context, Palaeolandscapes and Prehistoric Occupation of Wadi Ziqlâb, Northern Jordan.* Dissertation, University of Toronto (Toronto 2005).

The present research involves the application of geoarchaeological theory and methods to the archaeological record of northern Jordan. A geoarchaeological survey conducted in 2000 and 2001 focussed on documenting and sampling ancient river terraces in Wadi Ziqlab, Jordan. It aimed to reconstruct Late Pleistocene and Early Holocene palaeolandscapes and river valley changes and relate Quaternary landscape changes to shifts in settlement and land-use throughout prehistory. Micromorphology has proven particularly useful at identifying a Pleistocene palaeosol

that once comprised a continuous soil cover throughout the main river valley during the Middle Epipalaeolithic and confirming stratigraphic correlations between examined sections.

Excavations at a Middle Epipalaeolithic site, 'Uyyun al-Hammâm, have emphasized regional variability in the nature of site occupation for this time period (ca. 15 000 BP). Sites in the Mediterranean zone are typically substantial sites, with occupations characterised by single-component, thick deposits containing high densities of lithics, fauna and other cultural material. They may have been occupied for longer durations, or, repeatedly occupied over several years. Contrary to current cultural-chronological reconstructions, 'Uyyun al-Hammâm appears more similar to these larger Mediterraneanzone sites in Israel than to other nearby, contemporary sites in Jordan. Finally, the assemblage at 'Uyyun al-Hammâm supports the notion that the social and technological complexity witnessed in the Natufian period represents a culmination of gradual changes beginning during the climatic optimum of the Bølling-Allerød in the Early and Middle Epipalaeolithic [Byrd, 1998 # 622].

In addition, this research emphasizes the importance of local geoarchaeological investigations when reconstructing settlement patterns and site-formation processes. In Wadi Ziqlab, Epipalaeolithic sites appeared lacking from the archaeological record until a purposive survey was designed to focus on particular landscape elements, such as ancient river terraces, useful for palaeolandscape reconstruction. Detecting sites and contextualising their occurrence and distribution in the landscape requires a detailed understanding of geomorphological processes of landscape change. Often, the distribution of archaeological material on the landscape is as much the result of natural factors, like erosion and alluviation, as cultural processes.

Maher 2011

Lisa A. Maher, Jay T. Stock, Sarah Finney, James J. N. Heywood, Preston T. Miracle & Edward B. Banning, *A Unique Human-Fox Burial from a Pre-Natufian Cemetery in the Levant (Jordan)*. PLoS ONE **6** (2011), e15815. DOI:10.1371/journal.pone.0015815.

New human burials from northern Jordan provide important insights into the appearance of cemeteries and the nature of human-animal relationships within mortuary contexts during the Epipalaeolithic period (c. 23,000–11,600 cal BP) in the Levant, reinforcing a socio-ideological relationship that goes beyond predator-prey. Previous work suggests that archaeological features indicative of social complexity occur suddenly during the latest Epipalaeolithic phase, the Natufian (c. 14,500–11,600 cal BP). These features include sedentism, cemeteries, architecture, food production, including animal domestication, and burials with elaborate mortuary treatments. Our findings from the pre-Natufian (Middle Epipalaeolithic) cemetery of 'Uyun al-Hammam demonstrate that joint human-animal mortuary practices appear earlier in the Epipalaeolithic. We describe the earliest human-fox burial in the Near East, where the remains of dogs have been found associated with human burials at a number of Natufian sites. This is the first time that a fox has been documented in association with human interments pre-dating the Natufian and with a particular suite of grave goods. Analysis of the human and animal bones and their associated artefacts provides critical data on the nature and timing of these newlydeveloping relationships between people and animals prior to the appearance of domesticated dogs in the Natufian.

Neeley 1998

Michael P. Neeley, Jane D. Peterson, Geoffrey A. Clark, Suzanne K.

Fish & Margaret Glass, *Investigations at Tor al-Tareeq, An Epipaleolithic Site in the Wadi el-Hasa, Jordan.* Journal of Field Archaeology **25** (1998), 295–317.

The Epipaleolithic site of Tor al-Tareeq (WHS 1065) was discovered in 1982 by Burton MacDonald's Wadi Hasa Survey in west-central Jordan, suiface collected and tested in 1984, and partially excavated in 1992. The earliest and best represented occupation is an early Epipaleolithic industry, overlain in places by an ephemeral geometric industry identified by a higher incidence ofgeometric microliths. Six radiocarbon determinations span the period between 16,900 and 15,600 b.p. and confirm an early Epipaleolithic date but the subsequent geometric phase has not been dated. The site consists ofa series of camps, near a collapsed rockshelter and a spring, and strung out along the shore of a mildly-alkaline, late Pleistocene lake. The permanent water and varied resource zones surely made the locale attractive in an otherwise arid landscape. Faunal remains and pollen from the site indicate diverse resources in conditions substantially different from those of today. This report examines a wide range of archaeological and paleoenvironmental data in order to understand aspects of the regional system of settlement and subsistence ofwhich Tor al-Tareeq was apart. Continuing research in the eastern Hasa drainage seems likely to provoke a reassessment of current models ofhunter-gatherer adaptation during the Epipaleolithic in the southern Levant.

Peters 2004

Joris Peters & Klaus Schmidt, *Animals in the symbolic world of Pre-Pottery Neolithic Göbekli Tepe, south-eastern Turkey, A preliminary assessment.* Anthropozoologica **39** (2004), 179–218.

The recently discovered Pre-Pottery Neolithic site of Göbekli Tepe (SETurkey) is unparalleled in its architecture and art. The latter is particularly rich in animal depictions — stone figurines, sculptures and megalithic pillars decorated with bas-reliefs — and illustrates the prominent role animals played in the spiritual world of PPN human groups frequenting the site. Up to now, ten vertebrate taxa could be identified, nine of which also appeared in the archaeofaunal record of the site. Discussion focussed upon the possible role of the animal species figured at Göbekli Tepe, in particular whether the space demarcated by the pillars could have witnessed the performance of hunting rituals, initiation and passage rites, spiritual encounters or funeral practices. In view of our limited knowledge about the role animals played in the symbolic world of the PPN, in particular with respect to the logic and metaphysics governing the choice of species, the question of what purpose the enclosures served will take much more time to be properly answered.

Keywords: Turkey, | SE Anatolia, | megalithic art, | PPNA, | animal symbolism, | archaeofauna

Samuelian 2003

Nicolas Samuelian, *"Explicit Features" and "Latent Features", The Case of the Final Natufian at Mallaha (Eynan).* Bulletin du Centre de recherche français à Jérusalem **12** (2003), 126–136.

Schmidt 2000

K. Schmidt, *Göbekli Tepe, Southeastern Turkey, A Preliminary Report on the 1995–1999 Excavations.* Paléorient **26** (2000), i, 45–54.

The PPN mound of Göbekli Tepe is situated on top of a mountain north of the Harran plain , near the town of §anliurfa in Southeastern Turkey. No comparable site is known so far in the Near East in terms of the topographical setting , its

megalithic architecture, large scale stone sculptures and several other unusual items. The importance of the religious function of this site can hardly be denied. To the common model of Early Village Farming Communities of the Near East , molded by ecological and economical factors , Göbekli Tepe offers a quite different point of view.

Keywords: Upper Mesopotamia, Fertile Crescent, Golden Triangle, PPN, Neolithization, Megaliths, Pillars, Religion

Shimelmitz 2004

R. Shimelmitz, R. Barkai & A. Gopher, *The Geometric Kebaran Microlithic Assemblage of Ain Miri, Northern Israel*. Paléorient **30** (2004), ii, 127–140.

This article discusses an important assemblage of microliths from the Geometric Kebaran site of Ain Miri in the Upper Galilee, Israel. Geometric microliths dominate the assemblage and these comprise trapezes and rectangles, with some parallelograms and a small number of lunates. Strict definitions were used to describe the complete geometric microliths (which avoided the use of the general term trapeze/rectangle) and neutral descriptive terms were used for the broken geometric microliths. Significant metrical differences were observed between the trapezes, asymmetric trapezes-A and the rectangles. It was also noticed that the various types of geometric microliths show a different pattern of change through time thus supporting the decision not to use the general term trapeze/rectangle. While analyzing the Ain Miri microliths, projectile fractures were noticed and studies suggested different hafting patterns for trapezes and rectangles.

Keywords: Geometric Kebaran, Microliths, Epipaleolithic, Northern Israel, Projectile fractures.

Valla 1997

François R. Valla & Hamoudi Khalaily, *Les premiers sédentaires en Israël, Mallaha (Eynan 1996)*. Bulletin du Centre de recherche français à Jérusalem **1** (1997), 59–71.

Valla 2002

François R. Valla, Hamoudi Khalaily, Nicolas Samuelian & Fanny Bocquentin, *From Foraging to Farming, The Contribution of the Mallaha (Eynan) Excavations, 1996–2001*. Bulletin du Centre de recherche français à Jérusalem **10** (2002), 71–90.

Wiechmann 2012

Ingrid Wiechmann, *Poor DNA preservation in bovine remains excavated at Pre-Pottery Neolithic Göbekli Tepe (Southeast Turkey), Brief communication*. In: Elke Kaiser, Joachim Burger & Wolfram Schier (Hrsg.), *Population Dynamics in Prehistory and Early History, New Approaches by Using Stable Isotopes and Genetics*. Topoi – Berlin Studies of the Ancient World 5 (Berlin 2012), 41–41.

With regard to the domestication history of cattle the molecular genetic investigation of bovid remains excavated at Neolithic sites in the Near East may help to characterize the original mtDNA haplotypes. The preliminary results obtained for bovine remains excavated at the Early Neolithic site Göbekli Tepe, however, indicate a poor DNA preservation.

Keywords: Göbekli Tepe, domestication, Bos, ancient DNA, mtDNA

Grundlagen

Hillman 1997

G. C. Hillman, A. J. Legge & P. A. Rowley-Conwy, *On the Charred Seeds from Epipalaeolithic Abu Hureyra: Food or Fuel?* Current Anthropology **38** (1997), 651–655.

We certainly do not wish to dismiss the argument that dung burning was, indeed, one of the sources of charred assemblages of seeds on some later (Neolithic and post-Neolithic) sites practicing pastoralism but lacking adequate supplies of woody fuels, just as is proposed by Miller. But for Epipalaeolithic Abu Hureyra we conclude that the burning of dung is unlikely to account for a significant proportion, if any, of the seeds found at the site. Collection for food and other purposes as originally concluded by Hillman, Colledge, and Harris (1989) is far more likely to explain the arrival of the majority of the seeds and fruits. However, if the Epipalaeolithic population of Abu Hureyra is eventually found to have practiced some cultivation, then different modes of arrival may have to be considered for some of the seed taxa, as cultivation of domesticates harvested by sickle or uprooting inevitably introduces additional modes of arrival of certain plant materials.

Hodder 2014

Ian Hodder, *The Entanglements of Humans and Things, A Long-Term View.* New Literary History **45** (2014), 19–36.

The environment is not just a backdrop within which we fix problems; rather it is actively involved in our being as a species. And this codependence, as we have seen, leads ineluctably to dependency and more entanglement. So to fiddle and fix, as we always have done, seems to be the only solution. But we have perhaps come close to the end of the sustainability of this human impulse. Perhaps we need to face the possibility that fixing our technologies of codependency only increases rather than resolves the problem. The long-term perspective of increased entanglement offered by archaeology and human evolution suggests the need to look deep inside ourselves and into what it means to be human. The moral choice is substantial: to change what it is to be human, to become something other than ourselves.

Meier 2013

Thomas Meier & Astrid Zotter, *Ritualgegenstände und Materialität.* In: Christiane Brosius, Axel Michaels & Paula Schrode (Hrsg.), *Ritual und Ritualdynamik, Schlüsselbegriffe, Theorien, Diskussionen.* UTB 3854 (Göttingen 2013), 135–143.

Etwa seit der Jahrtausendwende erlebt die Beschäftigung mit der materiellen Seite von Kultur und der Dinglichkeit der Dinge erneut großen Zulauf in den Geistes- und Sozialwissenschaften. Aus den vielfältigen Diskussionen in den sogenannten Material Culture Studies werden im Folgenden zunächst einige einflussreiche Forschungsansätze vorgestellt, um dann die gegenständliche Dimension von Ritualen zu problematisieren. Ein archäologisches und ein indologisches Beispiel illustrieren, wie Gegenstände einen eigenen Zugang zum Ritual bieten können.

Miller 1996

Naomi F. Miller, *Seed Eaters of the Ancient Near East, Human or Herbivore?* Current Anthropology **37** (1996), 521–528.

Ambiguities in the evidence of postglacial vegetation change inspire some of the questions: Did the natural habitat of the wild wheats and barleys expand or did it

not? If the answer is yes, do the social and economic changes visible in the archaeological record reflect people's responses to the richness of new resources, and does dependence on these plant foods represent a decision to seek out plentiful, reliable resources? If the answer is no, were the grasses famine foods at best, and was it population pressure that forced people to resort to labor-intensive, second-choice resources? Without recapitulating all the arguments here, there are those who propose that late Natufian and related sedentary groups increasingly concentrated on only a few plant and animal resources (mainly the wild wheats and barleys and gazelle in the Levant, though some stress the importance of acorns) and others who would agree with Flannery's original proposal that the preagricultural "hunter-gatherers may well have specifically adapted their harvesting methods to maximize the spectrum of edible seeds".

If the charred-seed assemblages from Ali Kosh and Abu Hureyra are primarily remnants of dung-fueled fires, a number of our ideas about ancient plant use and wild or domestic herd management must be revised. The vast majority of seed remains were not destined for human consumption and burned accidentally, nor were they direct by-products of food processing. In short, the archaeobotanical evidence from cultural fill does not support the broad-spectrum hypothesis; it does not speak directly to it at all. Thus, the conclusions presented here eliminate one argument that has been used to support population-pressure theories of agricultural origins. The recognition that charred plant remains from cultural fill are primarily fuel remains enhances understanding of some assemblages and permits new questions to be asked of the data. For example, low numbers of seeds from some sites may be due to the ready availability of wood in the forested zones rather than to any lack of interest in plant foods on the part of ancient people. Where it is possible to compare material from a single time period and samples from the same depth below the modern surface, one would expect flotation samples from sites in forested regions to have smaller amounts of seed material relative to wood charcoal.

Samida 2013

Stefanie Samida & Manfred K. H. Eggert, *Das Materielle in den Kultur- und Sozialwissenschaften, Metatheoretische Reflexionen*. Mitteilungen der Anthropologischen Gesellschaft in Wien **143** (2013), 329–349.

This paper deals with the role of material culture in the cultural and social sciences. Paradigmatically, four major disciplines are being studied: Sociology, European ethnology/cultural studies, cultural anthropology/ethnology and archaeology. In a detailed analysis, similarities as well as differences with regard to the place of the universe of things in these fields are treated. As it becomes evident, there are not only different traditions of research but also different concepts of material culture. In the final section of the paper, a unifaction of the diverse strands of ématerial orientation' in the disciplines considered is being attempted.

Der Beitrag beschäftigt sich mit der Frage, ob in den Kulturwissenschaften ein gemeinsames Konzept von Materieller Kultur existiert. Dazu wird die kulturwissenschaftliche Diskussion zur Materiellen Kultur in vier prominenten Fachrichtungen – Soziologie, Europäische Ethnologie/Empirische Kulturwissenschaft, Ethnologie und Archäologie – umrissen. Es sollen Gemeinsamkeiten, aber auch Unterschiede herausgearbeitet werden. Abschließend wird das Ergebnis einer kritischen Reflexion unterzogen. Wir wollen zeigen, dass es nicht nur verschiedene Konzepte des Materiellen gibt, sondern dass diese auch in erkenntnistheoretischer Hinsicht verschieden sind. Wir diskutieren darüber hinaus, inwiefern sich manche auf den ersten Blick unüberwindbare Gegensätze auf metatheoretischer Ebene zusammen-

führen lassen und wie ein fachübergreifendes und damit kulturwissenschaftliches Konzept Materieller Kultur aussehen könnte

Jungpaläolithikum

MAHER 2012

Lisa A. Maher, Tobias Richter & Jay T. Stock, *The Pre-Natufian Epipaleolithic, Long-Term Behavioral Trends in the Levant*. Evolutionary Anthropology **21** (2012), 69–81.

Few cultural developments have taken on as much archeological significance as when people began living in villages and producing their own food. The economic, social, technological, and ideological transformations immediately preceding and following these changes were profound. Early models of culture change associated with pre-agricultural societies of the Levant focused on the sudden, late origin of settled farming villages triggered by climate change. Accompanying this new economic and living situation was durable stone-built architecture; intensified plant and animal use; a flourishing of art and decoration; new mortuary traditions, including marked graves and cemeteries; elaborate ritual and symbolic behavior—a new way of life. This new life style arguably had a slow start, but really took off during the Epipaleolithic period (EP), spanning more than 10,000 years of Levantine prehistory from c. 23,000-11,500 cal BP. The last EP phase, immediately preceding the Neolithic, is by far the best-studied in terms of its cultural and economic contributions to questions on the origins of agriculture.1–4 Recently, archeologists have considered the earlier parts of the EP to be more culturally dynamic and similar to the later phase (Natufian) than was previously thought.3–10 The earlier EP is increasingly seen as demonstrating the behavioral variability and innovations that help us to understand the economic, technological, and social changes associated with complex hunter-gatherers of the Natufian and farmers of the Neolithic. This paper traces the cultural and biological developments of the EP period leading up to the Natufian and considers the long-term trajectory of culture change, social complexity, and village life in the Near East.

MAHER 2012

Lisa A. Maher, Tobias Richter, Danielle Macdonald, Matthew D. Jones, Louise Martin & Jay T. Stock, *Twenty Thousand-Year-Old Huts at a Hunter-Gatherer Settlement in Eastern Jordan*. PLoS ONE **7** (2012), e31447. DOI:10.1371/journal.pone.0031447.

Ten thousand years before Neolithic farmers settled in permanent villages, hunter-gatherer groups of the Epipalaeolithic period (c. 22–11,600 cal BP) inhabited much of southwest Asia. The latest Epipalaeolithic phase (Natufian) is well-known for the appearance of stone-built houses, complex site organization, a sedentary lifestyle and social complexity—precursors for a Neolithic way of life. In contrast, pre-Natufian sites are much less well known and generally considered as campsites for small groups of seasonally-mobile hunter-gatherers. Work at the Early and Middle Epipalaeolithic aggregation site of Kharaneh IV in eastern Jordan highlights that some of these earlier sites were large aggregation base camps not unlike those of the Natufian and contributes to ongoing debates on their duration of occupation. Here we discuss the excavation of two 20,000-year-old hut structures at Kharaneh IV that pre-date the renowned stone houses of the Natufian. Exceptionally dense and extensive occupational deposits exhibit repeated habitation over prolonged periods, and contain structural remains associated with exotic and potentially symbolic caches of objects (shell, red ochre, and burnt horn

cores) that indicate substantial settlement of the site pre-dating the Natufian and outside of the Natufian homeland as currently understood.

Olszewski 2006

D. I. Olszewski, *Issues in the Levantine Epipaleolithic, The Madamaghan, Nebekian and Qalkhan (Levant Epipaleolithic)*. Paléorient **32** (2006), i, 19–26.

No two archaeological assemblages are ever identical. Archaeologists are thus continually faced with the problem of recognizing groups of assemblages that are more or less similar. Once grouped, these become named industries, traditions, techno-complexes, and so forth. Such entities are then contrasted with other groupings that contain different characteristics. One of the main problems, of course, is to know how different an assemblage must be from another assemblage in order to warrant the creation of a new grouping. While the splitter-lumper pendulum is always moving, it appears that for the Levantine Epipaleolithic, distinctions between groupings are currently being over-emphasized, because within this quite small geographical area during a relatively brief period of about 12 000 years, a minimum of 18 lithic industries has been identified.

This paper discusses three of these Epipaleolithic lithic industries, the Madamaghan, the Qalkhan, and the Nebekian. It is argued that these are not, in fact, distinct entities. A less than careful consideration of the microlith types and the inaccurate assignment of the site of Wadi Madamagh as a type assemblage for the Madamaghan have created undue confusion. Many sites currently assigned to these three lithic industries should actually be considered as belonging to the Nebekian.

Keywords: Epipaleolithic, Madamaghan, Qalkhan, Nebekian, Lithic typology, Microliths.

Richter 2013

Tobias Richter, Lisa A. Maher, Andrew N. Garrard, Kevan Edinborough, Matthew D. Jones & Jay T. Stock, *Epipalaeolithic settlement dynamics in southwest Asia, New radiocarbon evidence from the Azraq Basin*. Journal of Quaternary Science **28** (2013), 467–479.

A series of radiocarbon dates from two Epipalaeolithic sites – Kharaneh IV and Ayn Qasiyya – in the Azraq Basin of eastern Jordan provide a new perspective on the chronology and settlement patterns of this part of southwest Asia during the Late Pleistocene. We discuss the implications to our understanding of the chronology of Late Pleistocene lithic industries, particularly in regard to current hypotheses for the abandonment of eastern Jordan's 'mega-sites', Kharaneh IV and Jilat 6. Modelling a series of accelerator mass spectrometry dates from Kharaneh IV indicates a much shorter span of occupation for the site than previously assumed by the size and density of its deposits. Given the high density of material accumulated over a relatively short time span, we show that Kharaneh IV was an aggregation site occupied intensively by a significant number of people, providing new perspectives on the east Jordanian phenomenon of Epipalaeolithic 'mega-sites'.

Keywords: Epipalaeolithic; Azraq; Jordan; radiocarbon dating; aggregation sites.

Klima

Ashraf 2011

Quamrul Ashraf & Stelios Michalopoulos, *The Climatic Origins of the Neolithic Revolution, Theory and Evidence*. (unpublished 2011).

This research examines theoretically and empirically the origins of agriculture. The theory highlights the role of climatic sequences as a fundamental determinant of both technological sophistication and population density in a hunter-gatherer regime. It argues that foragers facing volatile environments were forced to take advantage of their geographic endowments at a faster pace. Consequently, as long as climatic shocks preserved the possibility for agriculture, diñerences in the rate at which foragers were climatically propelled to exploit their habitat determined the comparative evolution of hunter-gatherer societies towards farming. The theory is tested using both cross-country and cross-archaeological site data on the emergence of farming. Consistent with the theory, the empirical analysis demonstrates that, conditional on biogeographic endowments, climatic volatility has a non-monotonic –ñect on the timing of the transition to agriculture. Farming was undertaken earlier in regions characterized by intermediate levels of climatic volatility, with regions subjected to either too high or too low intertemporal variability transiting later.

Keywords: Hunting and Gathering, Agriculture, Neolithic Revolution, Climatic Volatility, Technological Progress, Population Density.

Curry 2014

Andrew Curry, *Racing the thaw*. science **346** (2014), 157–159.

Archaeologists scramble to recover artifacts emerging from alpine ice.

Maher 2011

Lisa A. Maher, E. B. Banning & Michael Chazan, *Oasis or Mirage? Assessing the Role of Abrupt Climate Change in the Prehistory of the Southern Levant*. Cambridge Archaeological Journal **21** (2011), 1–30.

Few prehistoric developments have received as much attention as the origins of agriculture and its associated societal implications in the Near East. A great deal of this research has focused on correlating the timing of various cultural transformations leading up to farming and village life with dramatic climatic events. Using rigorously selected radiocarbon dates from archaeological sites and palaeoenvironmental datasets, we test the predominate models for culture change from the early Epipalaeolithic to the Pottery Neolithic (c. 23,000–8000 cal. bp) to explore how well they actually fit with well-documented and dated palaeoclimatic events, such as the Bølling-Allerød, Younger Dryas, Preboreal and 8.2 ka event. Our results demonstrate that these correlations are not always as clear or as consistent as some authors suggest. Rather, any relationships between climate change and culture change are more complicated than existing models allow. The lack of fit between these sources of data highlight our need for further and more precise chronological data from archaeological sites, additional localized palaeoclimatic data sets, and more nuanced models for integrating palaeoenvironmental data and prehistoric people's behaviours.

Marcott 2014

Shaun A. Marcott et al., *Centennial-scale changes in the global carbon cycle during the last deglaciation*. nature **514** (2014), 616–619.

n514-0616-Supplement.xlsx

Shaun A. Marcott, Thomas K. Bauska, Christo Buizert, Eric J. Steig, Julia L. Rosen, Kurt M. Cuffey, T. J. Fudge, Jeffery P. Severinghaus, Jinho Ahn, Michael L. Kalk, Joseph R. McConnell, Todd Sowers, Kendrick C. Taylor, James W. C. White & Edward J. Brook

Global climate and the concentration of atmospheric carbon dioxide (CO2) are correlated over recent glacial cycles1,2.The combination of processes responsible

for a rise in atmospheric CO2 at the last glacial termination1,3 (23,000 to 9,000 years ago), however, remains uncertain1–3. Establishing the timing and rate ofCO2 changes in the past provides critical insight into the mechanisms that influence the carbon cycle and helps put present and future anthropogenic emissions in context. Here we presentCO2 and methane (CH4) records of the last deglaciation from a new high-accumulation West Antarctic ice core with unprecedented temporal resolution and precise chronology.We show that although low-frequency CO2 variations parallel changes in Antarctic temperature, abrupt CO2 changes occur that have a clear relationship with abrupt climate changes in the Northern Hemisphere. A significant proportion of the direct radiative forcing associated with the rise in atmospheric CO2 occurred in three sudden steps, each of 10 to 15 parts per million. Every step took place in less than two centuries and was followed by no notable change in atmospheric CO2 for about 1,000 to 1,500 years. Slow,millennial-scale ventilation of Southern Ocean CO2-rich, deep-ocean water masses is thought to have been fundamental to the rise in atmospheric CO2 associated with the glacial termination4, given the strong covariance of CO2 levels and Antarctic temperatures5. Our data establish a contribution from an abrupt, centennial-scale mode of CO2 variability that is not directly related to Antarctic temperature. We suggest that processes operating on centennial timescales, probably involving the Atlantic meridional overturning circulation, seem to be influencing global carbon-cycle dynamics and are at present not widely considered in Earth system models.

Napierala 1991

Hannes Napierala, Wim van Neer, Andrew W. Kandel, Joris Peters, Hans-Peter Uerpmann & Nicholas J. Conard, *Fish in the Desert? The Younger Dryas and its Influence on the Paleoenvironment at Baaz Rockshelter, Syria.* In: Ofer Bar-Yosef & François R. Valla (Hrsg.), *The Natufian Culture in the Levant.* Archaeological Series 1 (Ann Arbor 1991), 73–82.

The finds from Baaz Rockshelter are a strong indicator that the Late Natufians experienced quite favorable climatic conditions. Bones of the brown trout point to lower mean temperatures and higher precipitation that allowed for perennial streams in the vicinity of the site. The larger mammals also support our view of a closed vegetation cover with stands of higher vegetation that are required by the cervids. Further evidence comes from the speleothems of the Southern Levant and the site distribution patterns that can be observed. As has been shown, botanical remains from a wider geographic context equally support our hypothesis. This evidence contradicts earlier hypotheses that the climatic cooling of the Younger Dryas led to an aridification that can be paralleled with cultural shifts from the Early to Late Natufian. The cultural and climatic processes at the transition from Pleistocene to Holocene are a key in understanding the shift from hunting and gathering to food production, one of the major innovations in human history. How, when and why these innovations took place still cannot be pinpointed. We hope to have contributed a further piece to the puzzle in showing that cultural changes within the Natufian cannot be explained by mere climatic deterioration and that the YD was not the environmental crisis it was thought to have been.

Willcox 2009

George Willcox, Ramon Buxo & Linda Herveux, *Late Pleistocene and early Holocene climate and the beginnings of cultivation in northern Syria.* The Holocene **19** (2009), 151–158.

Climate change has been interpreted as a contributing factor to the emergence of agriculture in the Near East. We examine how climate change may have affected the availability of food plants and their cultivation in northern Syria at the end of the Pleistocene and the beginning of the Holocene. Charred plant remains from sites representing 11 archaeological levels indicate that during the late Pleistocene rye was commonly used, together with seeds gathered from the floodplain. During the early Holocene, rye and floodplain plants go out of use and barley then emmer wheat become common, pulses, lentils, peas and vetches increase in use and figs, chickpeas and horse beans were introduced. Pre-domestic cultivation is difficult to identify in the absence of morphologically domesticated plants. We cannot identify precisely when cultivation started but the possibility of cultivation is not excluded for the late Pleistocene, however we argue that it did not become a reliable means of subsistence until the Holocene. This period coincides with a decrease in the amplitude of climatic oscillations and global warming. With these conditions, combined with an increase in rainfall, we suggest cultivation developed into a sustainable economy. The earliest morphologically domestic cereals found in this area date to about 10 000 cal. yr BP. These may have been slow to become established because seed for sowing may have occasionally been replenished from the wild.

Keywords: Holocene, Younger Dryas, Syria, climate, cultivation, wild cereals.

Mesolithikum

Bar-Yosef 1989

Ofer Bar-Yosef & Anna Belfer-Cohen, *The Origins of Sedentism and Farming Communities in the Levant*. Journal of World Prehistory **3** (1989), 447–498.

Particular geographic features of the Mediterranean Levant underlie the subsistence patterns and social structures reconstructed from the archaeological remains of Epi-Paleolithic groups. The Kebaran, Geometric Kebaran, and Mushabian complexes are defined by technotypological features that reflect the distributions of social units. Radiocarbon dating and paleoclimatic data permit us to trace particular groups who, facing environmental fluctuations, made crucial changes in subsistence strategies, which, in the southern Levant, led to sedentism in base camps on the ecotone of the Mediterranean woodland-parkland and the lrano-Turanian steppe. The establishment of Early Natufian sedentary communities led to a regional change in settlement pattern. The relatively cold and dry climate of the eleventh millennium B.P. forced Negev groups into a special arid adpatation. The early Holocene onset of wetter and warmer conditions favored the earliest Neolithic (PPNA) development of village life based on the cultivation of barley and legumes', gathering of wild seeds and fruits and continued hunting.

Keywords: Levant; Epi-Paleolithic; Natufian; Early Neolithic; Sedentism; Origins of Agriculture.

Bocquentin 2006

Fanny Bocquentin, *Pour une approche anthropologique de la transition Épipaléolithique-Néolithique au Proche-Orient*. Bulletin du Centre de recherche français à Jérusalem **17** (2006), 41–51.

Bocquentin 2007

Fanny Bocquentin, *A Final Natufian Population, Health and Burial Status at Eynan-Mallaha*. In: Marina Faerman, Liora Kol-

ska Horwitz, Tzipi Kahana & Uri Zilberman (Hrsg.), *Faces from the Past: Diachronic Patterns in the Biology of Human Populations from the Eastern Mediterranean*, *Papers in honour of Patricia Smith*. BAR International Series 1603 (Oxford 2007), 66–81.

The first anthropological data available for the end of the Epipaleolithic period in the Levant is presented here through a description of the Final Natufian skeletons discovered to date at Eynan-Mallaha (Upper Galilee, Israel). Several aspects of the burial customs (such as spatial organization, burial selection, and treatment of the corpse) are described and compared to the previous practices of the Early and Late Natufian. Their biology and health status are discussed with an emphasis on dental pathology (enamel hypoplasia and carious lesions). An interesting diachronic pattern is shown in this Upper Galilee population, where stress indicators drop dramatically from the Early to the Final Natufian phases. The prevalence of carious lesions is highest during this latest chronological phase and breaks the pattern of a low frequency of caries that characterized the Late Natufian. Subsistence strategies or plant resource exploitation may have changed at the end of the Natufian.

Keywords: Final Natufian, Eynan-Mallaha, burial customs, stress status, occupational indicators, diachronic changes

Dubreuil 2004

Laure Dubreuil, *Long-term trends in Natufian subsistence*, *A use-wear analysis of ground stone tools*. Journal of Archaeological Science **31** (2004), 1613–1629.

The author studied intensification of plant use (including cereal consumption) during the Natufian period of the Levant, using microscopic analysis of use-wear on 166 basalt grinding stones from Natufian sites. These prehistoric grinding surfaces were compared to those created on an experimental collection of basalt stones used for known tasks. The Natufian tools were judged to have been used for a variety of purposes, including hide working, legume processing, cereal processing, and mineral grinding. There seemed, however, to be a clear increase over time in the use of grinding slabs with flat surfaces, suitable for reducing cereals and legumes to tinier particles, with a concomitant increase in the release of nutrients. This trend may help explain the appearance of agriculture at the end of the Natufian.

Keywords: Natufian; Levant; Grinding stones; Use-wear analysis; Agricultural origins

Valla 2010

François R. Valla, Hamoudi Khalaily, Nicolas Samuelian & Fanny Bocquentin, *What Happened in the Final Natufian?* Journal of The Israel Prehistoric Society **40** (2010), 131–148.

Weinstein-Evron 1999

M. Weinstein-Evron, B. Lang & S. Ilani, *Natufian trade/exchange in basalt implements*, *Evidence from Northern Israel*. Archaeometry **41** (1999), 267–273.

Three Natufian base camps in Israel—el-Wad, Hayonim and Eynan—have nearby basalt sources, but K/Ar ages indicate that their inhabitants obtained implements, made of Miocene-Pliocene and Quaternary basalts, further afield. The nearest locations, in which raw material sources representing the whole range of

dated basalts occur within a relatively restricted area, are to be found east of the Jordan Valley, suggesting movement of the material some 100 km to el-Wad, 60 km to Hayonim and 20 km to Eynan. The exact nature of these long-distance contacts and the underlying social and economic systems and mechanisms are yet to be determined.

Keywords: Israel, Epipalaeolithic, Natufian, K/Ar dating, stone implements, basalt, exchange, trade

Metallzeiten

Kristiansen 2010

Kristian Kristiansen, *The Nebra find and early Indo-European religion*. In: Harald Meller & François Bertemes (Hrsg.), *Der Griff nach den Sternen*, *Internationales Symposium in Halle (Saale) 16.–21. Februar 2005*. Tagungen des Landesmuseums für Vorgeschichte Halle 5 (Halle 2010), 431–437.

The Nebra find raises in paradigmatic way central questions about the nature of early Bronze Age religion. In the following paper I propose that by placing it in a wider interdisciplinary field of knowledge it is possible to understand the ritual and religious role of the Nebra find.

It can be demonstrated that it fits very well into a ritual pattern of depositions, just as its dualism corresponds to a similar religious dualism in Proto-Indo-European religion, represented by the heavenly or "Divine Twins". The two axes and swords are a worldly representation of these gods who carried the sun and whose mortal representatives can be identified by the recurring deposition of twin axes, swords, helmets and lurs throughout the Bronze Age.

This interpretation further supports the authenticity of the find. The unique bronze disc with sun, moon, stars and heavenly ship supports the interpretation of a shared, syncretistic Bronze Age religion from the Near East to Scandinavia based upon a sun cult. Just as the Trundholm Sun Disc represents a specific Nordic interpretation of Near Eastern sun discs, so the Nebra Sky Disc represents an interpretation of Near Eastern cosmological iconography and knowledge, transmitted to a European Bronze Age context. It indicates that the myth of the journey of the sun was anchored in a complex astronomic and cosmological system of knowledge performed by people with a special position in Bronze Age society, who can be identified in burials and hoard depositions.

Keywords: Bronze Age, ritual depositions, dualism, "Divine Twins"

Neolithikum

Abbo 2010

Shahal Abbo, Simcha Lev-Yadun & Avi Gopher, *Yield stability*, *An agronomic perspective on the origin of Near Eastern agriculture*. Vegetation History and Archaeobotany **19** (2010), 143–150.

Here we argue that, based on evolutionary, ecological and agronomic considerations, climate change could not have been a suitable background nor a probable cause of plant domestication in the Near East. This thesis is developed based on the year-to-year yield dynamics in traditional rainfed grain farming in semi-arid environments, on the genetic basis that underlies temporal yield dynamics in natural wild cereal populations as well as in traditional farming systems, and upon the

recognition that prior to elaborate high capacity and long-range trade networks, yield stability was more important than yield maximization. We also briefly discuss the likely social and cultural responses to subtle and real climatic changes vs. responses to rapid directional environmental trends. Taking into account the agronomic, ecological and genetic aspects discussed, it is suggested that the Near Eastern founder crop assemblage was chosen to function within the normal east Mediterranean precipitation regime, in which good rainy years create the 'normal surplus' that sustains farming communities during drought years, and the different crop types provide the system with its compensating ability. A slow (but real) climatic change is unlikely to induce major (revolutionary) cultural changes. Nor would a prominent environmental change provide the proper background for the origins of agriculture because it would abolish the buffering capacity of the system. Therefore, farming cannot function as a sustainable 'buffering mechanism' to counterbalance climatic instability causing natural resource depletion.

Keywords: Land races | Natural resources | Plant domestication | Traditional agriculture

Eshed 2006

Vered Eshed, Avi Gopher & Israel Hershkovitz, *Tooth Wear and Dental Pathology at the Advent of Agriculture, New Evidence From the Levant*. American Journal of Physical Anthropology **130** (2006), 145–159.

Differences in patterns of diet and subsistence through the analysis of dental pathology and tooth wear were studied in skeletal populations of Natufian hunter-gatherers (10,500–8300 BC) and Neolithic populations (8300–5500 BC, noncalibrated) from the southern Levant. 1,160 Natufians and 804 Neolithic teeth were examined for rate of attrition, caries, antemortem tooth loss, calculus, periapical lesions, and periodontal processes. While the Natufian people manifest a higher rate of dental attrition and periodontal disease (36.4 % vs. 19 %), Neolithic people show a higher rate of calculus. Both populations manifested low and similar rates of caries (6.4 % in the Natufian vs. 6.7 % in the Neolithic), periapical lesions (not over 1.5 %), and antemortem tooth loss (3.7 % vs. 4.5 %, respectively). Molar wear pattern in the Neolithic is different than in the Natufian. The current study shows that the dental picture obtained from the two populations is multifactorial in nature, and not exclusively of dietary origin, i.e., the higher rate and unique pattern of attrition seen in the Natufian could result from a greater consumption of fibrous plants, the use of pestles and mortars (which introduce large quantities of stone-dust to the food), and/ or the use of teeth as a "third hand." The two major conclusions of this study are: 1) The transition from hunting and gathering to a food-producing economy in the Levant did not promote changes in dental health, as previously believed. This generally indicates that the Natufians and Neolithic people of the Levant may have differed in their ecosystem management (i.e., gathering vs. growing grains), but not in the type of food consumed. 2) Changes in food-preparation techniques and nondietary usage of the teeth explain much of the variation in tooth condition in populations before and after the agricultural revolution.

Keywords: dental pathology; tooth wear; diet; agriculture; Neolithic; hunter-gatherer; Natufian; Levant

Goodale 2001

Nathan B. Goodale & Sam J. Smith, *Pre-Pottery Neolithic A Projectile Points at Dhra', Jordan, Preliminary Thoughts on Form, Function, and Site Interpretation*. Neo-Lithics **2001**, ii, 1–5.

Despite the rapid increase in the frequency of projectile points at the beginning of the Neolithic, they have been regularly interpreted as being associated with a hunting economy during the forager-to-farming transition. Subsequently, sites with high projectile point frequencies have been considered to indicate prehistoric populations relying on terrestrial faunal resources. We feel that the interpretations based on stylistic and typological classifications may be flawed in nature.

Projectile points in the southern Levant have traditionally been interpreted as being associated with a focus on hunting, despite their appearance at the beginning of the Neolithic. Fewer projectile points in an assemblage are interpreted as indicative of a heavier reliance on plant resources. Following this model, Dhra' would be classified as either a hunting locality or a residential site with a focus on hunting.

Microwear analyses have often demonstrated that assuming a function for a tool, or type of tool, based on the intuition of the archaeological community, or by comparison to tool use in ethnographically studied societies, is a strategy fraught with peril.

It seems that the efficiency of the haft would govern the amount of use-wear evident on the tool. A very efficient haft, probably incorporating mastic that firmly secures the tool, would tend to leave very few wear traces. Conversely, a less stable haft that allows the tool some movement would cause more discernable wear traces. It is possible that the el-Khiam points at Dhra' were hafted in a fairly loose manner, possibly without the use of mastics.

Of the six points with interpretable wear traces, only one showed clear evidence of projectile use (as defined by Fischer et al. 1984; Odell 1988). This was in the form of a bending fracture to the tip and a streak of polish emanating near the tip and running parallel to the orientation of the piece. The remaining tools appear to have been utilized as perforators of various types: either with a rotary motion as a drill or borer or as a piercer or punch utilizing longitudinal motion. One specimen revealed evidence of at least two functions: the tip had been used as a perforator whilst one edge had been used for cutting.

Guzmán 2011

Ricardo Andrés Guzmán & Jacob Weisdorf, *The Neolithic Revolution from a price-theoretic perspective*. Journal of Development Economics **96** (2011), 209–219.

The adoption of agriculture during the Neolithic period triggered the first demographic explosion in history. When fertility returned to its original level, agriculturalists were more numerous, more poorly nourished, and worked longer hours than their hunter–gatherer ancestors. We develop a dynamic price-theoretic model that rationalizes these events. In the short run, people are lured into agriculture by the increased labor productivity of both adults and children. In the long run, the growth in population overrides the productivity gains, and the later generations of agriculturalists end up being worse-off than the hunter–gatherers. Counter-intuitively, the increase in the labor productivity of children causes the long-run reduction in welfare. In the long run, the increase in adult labor productivity only contributes to population growth.

Keywords: Neolithic Revolution | Hunter–gatherers | Child labor | Thomas Malthus

Müller-Neuhof 2014

Bernd Müller-Neuhof, *What did they need arrowheads for? Thoughts About Projectile Points and Hunting Strategies in the SW-Asian PPN*. In: B. Finlayson & C. Makarewicz (Hrsg.), *Settlement,*

Survey and Stone, Essays on Near Eastern Prehistory in Honour of Gary Rollefson. (Berlin 2014), 227–233.

Projectile points are one of the most important lithic tool classes for archaeological research on the Pre-Pottery Neolithic in southwest Asia, as the definition of chronologies, reconstruction of technological processes and the interpretation of subsistence strategies rely in part on these items. A common-sense interpretation amongst archaeologists is that projectile points were primarily used as hunting weapons, which at first sight is supported by the regular appearance of faunal remains from wild game in the archaeological record. However, there is almost a complete absence of osteological evidence in the faunal record for the use of projectile points as a hunting aid. This paper discusses this seemingly contradictory information in the archaeological record.

Nesbitt 1999

Mark Nesbitt, *When and where did domesticated cereals first occur in southwest Asia?* In: Reneé T. J. Cappers & Sytze Bottema (Hrsg.), *The Dawn of Farming in the Near East.* SENEPSE 6 (Berlin 2002), 113–132.

Agriculture and the Neolithic

Does the later date proposed here for first appearance of domesticates (the early PPNB, c. 9300 BP) affect our understanding of the Pre-Pottery Neolithic? If the PPNA is no longer viewed as a farming society (and even if Tell Aswad and other sites are accepted as agricultural sites, it is clear that some PPNA sites such as Netiv Hagdud were not), then the presumed link between the initiation of the Neolithic and the beginning of farming no longer holds good. Shorn of its economic links to the succeeding PPNB cultures, many PPNA sites seem to have far more in common with the preceding Late Epipalaeolithic (Natufian cultures), in terms of house shape and settlement size and organisation. While the PPNA continues to be a useftil chronological term, the use of the beginning of the Neolithic as marking a major transformation in human societies may be inappropriate. The question of when farming of crops has a significant impact on human subsistence lies outside the scope of this paper (see Harris chapter); in my view it does by the middle-PPNB period, as marked by the rapid spread of farming across the fertile crescent, and the large size of middle-PPNB sites, presumably reflecting an increase in population (Kuijt, 2000).

Explaining agricultural origins

Does the revised dating of domestication affect explanations of why farming began? Most explanations in the last two decades have invoked the environmental changes consequent on the end of the last Ice Age. Warmer and wetter climate led to a general increase in food resources available to hunter-gatherer populations, and it has been suggested that this enabled sedentism and a subsequent increase in population. However, explanations invoking population increase have become less popular because they are not supported by archaeological field-work, which shows no evidence of increase in settlement density in the Late Epipalaeolithic or PPNA periods. Instead, recent explanations have focused on the Younger Dryas, a period of cold and arid climate lasting from about 11,000-10,000 BP (Bar-Yosef, 1998; Harris, 1996; Moore and Hillman, 1992; Moore et al., 2000), although there is disagreement about its impact in southwest Asia (Bottema, 1995; Helmer et al., 1998). If domestication starts 700 (radiocarbon) years later, then the timing of domestication is clearly not linked to the Younger Dryas. Instead, cultivation of wild plants might have been a reaction to the Younger Dryas – and this will be more difficult to identify. The question then arises of why domesticated plants

appeared at all, if long-term cultivation of wild plants had been practised for so long without domestication occurring?

Pryor 2004

Frederic L. Pryor, *From Foraging to Farming, The so-called "Neolithic Revolution"*. Research in Economic History **22** (2004), 1–39.

This essay provides evidence that the invention of agriculture was not a dramatic technological advance in the history of humankind and that agriculture was quite consistent with nomadic hunting and gathering. The available clues also suggest that exact origins of agriculture do not seem important. Rather, the crucial question is why certain societies dramatically increased their dependency on agriculture for subsistence two to ten millennia ago. Unfortunately, most of the major theories purporting to explain the neolithic revolution –either the origins or the spread of agriculture –ar – either untestable or inconsistent with the available evidence. What is at stake for economic historians is to rethink the process of the adoption of agriculture using a multi-causal approach.

Weisdorf 2005

Jacob L. Weisdorf, *From Foraging to Farming, Explaining the Neolithic Revolution*. Journal of Economic Surveys **19** (2005), 561–586.

This article reviews the main theories about the prehistoric shift from hunting and gathering to agriculture. The transition, also known as the Neolithic Revolution, was ultimately necessary to the rise of modern civilization by creating the foundation for the later process of industrialization and sustained economic growth. The article provides a brief historical survey of the leading hypotheses concerning the rise of agriculture proposed in the archaeological and anthropological literature. It then turns to a more detailed review of the theories put forth in the economic literature.

Keywords: Agriculture; Hunting–gathering; Neolithic Revolution; Transition

Willcox 1996

George Wlllcox, *Evidence for plant exploitation and vegetation history from three Early Neolithic pre-pottery sites on the Euphrates (Syria)*. Vegetation History and Archaeobotany **5** (1996), 143–152.

Archaeobotanical results based on a limited number of samples from three aeeramie sites dating from 9800 to 7800 B.P., which are under excavation in the valley of the Middle Euphrates, are discussed. The finds are presented simply by presence, and are compared to the contemporary vegetation and finds from similar sites. Carbonised plant remains recovered by flotation from levels dated to between 9800 and 9200 B.P. (Dja'de and Jerf al Ahmar) indicate that wild cereals (einkorn wheat, rye and barley) and pulses (lentils, pea and bitter vetch) were exploited. Other plants such as wild grasses, Pistacia, wild almond and oak, suggest that the local vegetation provided a rich diversity of resources. A study of possible weed taxa is being carried out in order to see whether this assemblage could be used to identify the cultivation of morphologically wild cereals for this period. Ninth millennium B.P. levels at Halula see the appearance of domestic crops such as emmer, naked wheat and barley, but wild-type cereals persist. The cultivars appear to have been introduced from elsewhere and later ninth millennium B.P. species include olive and flax. Ash, vine, maple, plane, alder and elm from the gallery forest, wild rye, wild einkorn, deciduous oak, wild almond, Pistacia, and Pyrus, from the hinterland, indicate cooler conditions.

Keywords: Euphrates – Early Neolithic – Cereals Natural vegetation- Palaeoclimate

Willcox 2002

George Willcox, *Charred plant remains from a 10th millennium B.P. kitchen at Jerf el Ahmar (Syria)*. Vegetation History and Archaeobotany **11** (2002), 55–60.

The Pre-pottery Neolithic A (PPNA) site of Jerf el Ahmar, Syria, dated to the 10th millennium uncal B.P., has produced over 657 flotation samples which are now under study. The results described in this article were obtained from the analysis of 32 samples of charred plant remains taken from a room of 2.5 x 3 m, which had been destroyed by fire. The room contained three saddle querns, two flat polished stone plates (each of 60 cm in diameter), one hearth, and three limestone "basins". These objects were in situ and the room appeared to represent a food preparation area (kitchen). On one of the querns two charred seed cakes were found. The finely ground seeds have been identified as Brassica/Sinapis, a rare taxon for this period. The major taxa, which are morphologically wild, have distinct spatial distributions, which provide evidence for plant processing activities. Hordeum sponta-neum and Triticum/Secale were processed separately. The association of H. spontaneum with stone basins suggests soaking of this grain.

Keywords: Early Neolithic — Northern Syria – Food preparation – Seed cake – Wild cereals

Willcox 2008

George Willcox, Sandra Fornite & Linda Herveux, *Early Holocene cultivation before domestication in northern Syria*. Vegetation History and Archaeobotany **17** (2008), 313–325.

Charred plant remains from the sites of Tell Qaramel, Jerf el Ahmar, Dja'de and Tell 'Abr situated in northern Syria and dated to the tenth and ninth millennia cal B.C. demonstrate that a wide variety of wild pulses, cereals, fruits and nuts was exploited. Five lines of evidence suggest that cultivation was practised at three of the sites. (1) Wild einkorn, wild rye and lentils occur outside their natural habitats. (2) The founder crops barley, emmer and single-grained einkorn appear at different times. (3) An assemblage of weeds of cultivation was identified. (4) There is a gradual decrease in gathered plants such as small seeded grasses and Polygonum/Rumex. (5) Barley grains increase in breadth and thickness. Morphological domestication did not become established, perhaps because seed stock was regularly collected from wild stands. Charred rodent droppings indicate large-scale grain storage.

Keywords: Archaeobotany | Syria | Neolithic | Cultivation | Wild cereals | Early farming

Politik

Gerland 2014

Patrick Gerland et al., *World population stabilization unlikely this century*. science **346** (2014), 234–237.

s346-0234-Supplement.pdf

Patrick Gerland, Adrian E. Raftery, Hana Ševèíková, Nan Li, Danan Gu, Thomas Spoorenberg, Leontine Alkema, Bailey K. Fosdick, Jennifer Chunn, Nevena Lalic, Guiomar Bay, Thomas Buettner, Gerhard K. Heilig & John Wilmoth

The United Nations (UN) recently released population projections based on data until 2012 and a Bayesian probabilistic methodology. Analysis of these data

reveals that, contrary to previous literature, the world population is unlikely to stop growing this century. There is an 80 % probability that world population, now 7.2 billion people, will increase to between 9.6 billion and 12.3 billion in 2100. This uncertainty is much smaller than the range from the traditional UN high and low variants. Much of the increase is expected to happen in Africa, in part due to higher fertility rates and a recent slowdown in the pace of fertility decline. Also, the ratio of working-age people to older people is likely to decline substantially in all countries, even those that currently have young populations.

Waytz 2014

Adam Waytz, Liane L. Young & Jeremy Ginges, *Motive attribution asymmetry for love vs. hate drives intractable conflict*. PNAS **111** (2014), 15687–15692.

Five studies across cultures involving 661 American Democrats and Republicans, 995 Israelis, and 1,266 Palestinians provide previously unidentified evidence of a fundamental bias,whatwe term the "motive attribution asymmetry," driving seemingly intractable human conflict. These studies show that in political and ethnoreligious intergroup conflict, adversaries tend to attribute their own group's aggression to ingroup love more than outgroup hate and to attribute their outgroup's aggression to outgroup hate more than ingroup love. Study 1 demonstrates that American Democrats and Republicans attribute their own party's involvement in conflict to ingroup love more than outgroup hate but attribute the opposing party's involvement to outgroup hate more than ingroup love. Studies 2 and 3 demonstrate this biased attributional pattern for Israelis and Palestinians evaluating their own group and the opposing group's involvement in the current regional conflict. Study 4 demonstrates in an Israeli population that this bias increases beliefs and intentions associated with conflict intractability toward Palestinians. Finally, study 5 demonstrates, in the context of American political conflict, that offering Democrats and Republicans financial incentives for accuracy in evaluating the opposing party canmitigate this bias and its consequences.Although people find it difficult to explain their adversaries' actions in terms of love and affiliation, we suggest that recognizing this attributional bias and howto reduce it can contribute to reducing human conflict on a global scale.

intergroup conflict | ingroup love | outgroup hate | attribution | cognitive bias

Religion

Banning 2011

E. B. Banning, *So Fair a House, Göbekli Tepe and the Identification of Temples in the Pre-Pottery Neolithic of the Near East*. Current Anthropology **52** (2011), 619–660.

Archaeologists have proposed that quite a number of structures dating to the Pre-Pottery Neolithic A and B in southwest Asia were nondomestic ritual buildings, sometimes described specifically as temples or shrines, and these figure large in some interpretations of social change in the Near Eastern Neolithic. Yet the evidence supporting the identification of cult buildings is often equivocal or depends on ethnocentric distinctions between sacred and profane spaces. This paper explores the case of Go¿bekli Tepe, a large Pre-Pottery Neolithic site in Turkey that its excavator claims consisted only of temples, to illustrate weaknesses in some kinds of claims about Neolithic sacred spaces and to explore some of the problems of identifying prehistoric ritual. Consideration of the evidence suggests

the alternative hypothesis that the buildings at Go¿bekli Tepe may actually be houses, albeit ones that are rich in symbolic content.

Fuller 2001

Jill E. Fuller & Burke D. Grandjean, *Economy and Religion in the Neolithic Revolution, Material Surplus and the Proto-Religious Ethic.* Cross-Cultural Research **35** (2001), 370–399.

Does economic change stimulate religious transformation, or do new religious ideas inspire economic innovation? Since Marx and Weber, social theorists have considered this question, most often in regard to modern societies. Here, the authors examine archaeological evidence from 40 ancient sites in the Near East, where horticulture and herding first arose. Results suggest that economic surplus preceded two types of religious artifacts. In the authors' data, utilitarian grave gifts never appeared without surplus—in herds or especially in grain. Although their timing is less conclusive, animal figurines rarely appeared without herding. These two types of artifact are more strongly related to surplus than artifacts tapping wealth or social complexity generally (decorative grave gifts and human figurines). Hence, although the data prohibit elaborate statistical controls, the hypothesized associations seem nonspurious. Apparently, religious ideas did not prompt new methods of economic production. Rather, economic facts were crucial in shaping Neolithic social institutions, including religion.