

References

Aktuell

PENNISI 2014

Elizabeth Pennisi, *The River Masters*. [science](#) **346** (2014), 802–805.

Hippos are the nutrient kingpins of Africa’s waterways.

Unlike elephants, which are also in steep decline, hippos “do not have a champion,” says San Diego State University’s Lewison. The new portrait of the hippo as the unsung nutrient kingpin of sub-Saharan Africa suggests that as the animals decline, ecosystems will be transformed, affecting many other creatures.

THAISS 2014

Christoph A. Thaiss et al., *Transkingdom Control of Microbiota Diurnal Oscillations Promotes Metabolic Homeostasis*. [Cell](#) **159** (2014), 514–529.

Christoph A. Thaiss, David Zeevi, Maayan Levy, Gili Zilberman-Schapira, Jotham Suez, Anouk C. Tengeler, Lior Abramson, Meirav N. Katz, Tal Korem, Niv Zmora, Yael Kuperman, Inbal Biton, Shlomit Gilad, Alon Harmelin, Hagit Shapiro, Zamir Halpern, Eran Segal & Eran Elinav

All domains of life feature diverse molecular clock machineries that synchronize physiological processes to diurnal environmental fluctuations. However, no mechanisms are known to cross-regulate prokaryotic and eukaryotic circadian rhythms in multikingdom ecosystems. Here, we show that the intestinal microbiota, in both mice and humans, exhibits diurnal oscillations that are influenced by feeding rhythms, leading to time-specific compositional and functional profiles over the course of a day. Ablation of host molecular clock components or induction of jet lag leads to aberrant microbiota diurnal fluctuations and dysbiosis, driven by impaired feeding rhythmicity. Consequently, jet-lag-induced dysbiosis in both mice and humans promotes glucose intolerance and obesity that are transferable to germ-free mice upon fecal transplantation. Together, these findings provide evidence of coordinated metaorganism diurnal rhythmicity and offer a microbiome-dependent mechanism for common metabolic disturbances in humans with aberrant circadian rhythms, such as those documented in shift workers and frequent flyers.

YOUNGSTEADT 2014

Elsa Youngsteadt, Ryanna C. Henderson, Amy M. Savage, Andrew F. Ernst, Robert R. Dunn & Steven D. Frank, *Habitat and species identity, not diversity, predict the extent of refuse consumption by urban arthropods*. [Global Change Biology](#) (2014), preprint, 1–13. DOI:10.1111/gcb.12791.

GlobalChangeBiology2014-Youngsteadt-Supplement.pdf

Urban green spaces provide ecosystem services to city residents, but their management is hindered by a poor understanding of their ecology. We examined a novel ecosystem service relevant to urban public health and esthetics: the consumption of littered food waste by arthropods. Theory and data from natural systems suggest that the magnitude and resilience of this service should increase

with biological diversity. We measured food removal by presenting known quantities of cookies, potato chips, and hot dogs in street medians (24 sites) and parks (21 sites) in New York City, USA. At the same sites, we assessed ground-arthropod diversity and abiotic conditions, including history of flooding during Hurricane Sandy 7 months prior to the study. Arthropod diversity was greater in parks (on average 11 hexapod families and 4.7 ant species per site), than in medians (nine hexapod families and 2.7 ant species per site). However, counter to our diversity-based prediction, arthropods in medians removed 2–3 times more food per day than did those in parks. We detected no effect of flooding (at 19 sites) on this service. Instead, greater food removal was associated with the presence of the introduced pavement ant (*Tetramorium* sp. E) and with hotter, drier conditions that may have increased arthropod metabolism. When vertebrates also had access to food, more was removed, indicating that arthropods and vertebrates compete for littered food. We estimate that arthropods alone could remove 4–6.5 kg of food per year in a single street median, reducing its availability to less desirable fauna such as rats. Our results suggest that species identity and habitat may be more relevant than diversity for predicting urban ecosystem services. Even small green spaces such as street medians provide ecosystem services that may complement those of larger habitat patches across the urban landscape.

Keywords: ants, arthropods, biodiversity, ecosystem service, hurricane, urban food waste, urbanization

Amerika

POTTER 2014

Ben A. Potter, Joel D. Irish, Joshua D. Reuther & Holly J. McKinney, *New insights into Eastern Beringian mortuary behavior: A terminal Pleistocene double infant burial at Upward Sun River*. [PNAS 111 \(2014\), 17060–17065](#).

Here we report on the discovery of two infant burials dating to $\approx 11,500$ calibrated years (cal) B.P. at the Upward Sun River site in central Alaska. The infants were interred in a pit feature with associated organic and lithic grave goods, including the earliest known North American hafted bifaces with decorated antler foreshafts. Skeletal and dental analyses indicate that Individual 1 died shortly after birth and Individual 2 was a late-term fetus, making these the youngest-aged late Pleistocene individuals known for the Americas and the only known prenatate, offering, to our knowledge, the first opportunity to explore mortuary treatment of the youngest members of a terminal Pleistocene North American population. This burial was situated ≈ 40 cm directly below a cremated 3-y-old child previously discovered in association with a central hearth of a residential feature. The burial and cremation are contemporaneous, and differences in body orientation, treatment, and associated grave goods within a single feature and evidence for residential occupation between burial episodes indicate novel mortuary behaviors. The human remains, grave goods, and associated fauna provide rare direct data on organic technology, economy, seasonality of residential occupations, and infant/child mortality of terminal Pleistocene Beringians.

mortuary archaeology | Beringia | terminal Pleistocene | skeletal remains | Paleoindians

Anthropologie

CORTES BARRAGAN 2014

Rodolfo Cortes Barragan & Carol S. Dweck, *Rethinking natural altruism, Simple reciprocal interactions trigger children's benevolence*. [PNAS 111 \(2014\), 17071–17074](#).

A very simple reciprocal activity elicited high degrees of altruism in 1- and 2-y-old children, whereas friendly but nonreciprocal activity yielded little subsequent altruism. In a second study, reciprocity with one adult led 1- and 2-y-olds to provide help to a new person. These results question the current dominant claim that social experiences cannot account for early occurring altruistic behavior. A third study, with preschool-age children, showed that subtle reciprocal cues remain potent elicitors of altruism, whereas a fourth study with preschoolers showed that even a brief reciprocal experience fostered children's expectation of altruism from others. Collectively, the studies suggest that simple reciprocal interactions are a potent trigger of altruism for young children, and that these interactions lead children to believe that their relationships are characterized by mutual care and commitment.

reciprocity | altruism | social development | morality

FONTANARI 2014

Laura Fontanari, Michel Gonzalez, Giorgio Vallortigara & Vittorio Girotto, *Probabilistic cognition in two indigenous Mayan groups*. [PNAS 111 \(2014\), 17075–17080](#).

Is there a sense of chance shared by all individuals, regardless of their schooling or culture? To test whether the ability to make correct probabilistic evaluations depends on educational and cultural guidance, we investigated probabilistic cognition in preliterate and prenumerate Kaqchikel and K'iche', two indigenous Mayan groups, living in remote areas of Guatemala. Although the tested individuals had no formal education, they performed correctly in tasks in which they had to consider prior and posterior information, proportions and combinations of possibilities. Their performance was indistinguishable from that of Mayan school children and Western controls. Our results provide evidence for the universal nature of probabilistic cognition.

probabilistic cognition | literacy | numeracy | number cognition | cognitive development

HOLLIDAY 2014

Trenton W. Holliday, Joanna R. Gautney & Lukáš Friedl, *Right for the Wrong Reasons, Reflections on Modern Human Origins in the Post-Neanderthal Genome Era*. [Current Anthropology 55 \(2014\), 696–724](#).

Comments by Shara Bailey, Katerina Harvati, Jean-Jacques Hublin, Fred H. Smith, Chris Stringer, Erik Trinkaus, Milford H. Wolpoff & João Zilhão

The sequencing of the Neanderthal genome answered once and for all the question of whether these hominins played a role in the origins of modern humans—they did, and a majority of humans alive today retain a small portion of Neanderthal genes. This finding rejects the strictest versions of the Recent African Origin model and has been celebrated by supporters of Multiregional Evolution (MRE). However, we argue that MRE can also be rejected and that other, intermediate, models of modern human origins better represent the means by which modern humans became the only extant human species. We argue this because we reject one of the major tenets of MRE: global gene flow that prevents cladogenesis from

occurring. First, using reconstructions of Pleistocene hominin census size, we maintain that populations were neither large nor dense enough to result in such high levels of gene flow across the Old World. Second, we use mammalian divergence and hybridization data to show that the emergence of *Homo* is recent enough that member species of this genus were unlikely to have been reproductively isolated from each other, even in the absence of the high levels of global gene flow postulated by MRE supporters.

REYNA 2014

Valerie F. Reyna & Charles J. Brainerd, *Fuzzy universality of probability judgment*. [PNAS 111 \(2014\), 16984–16985](#).

Mayans without formal education succeeded at tasks such as judging proportions, combining probabilities, and updating beliefs that college-educated people fail. That failure occurs in simple choice tasks that require neither numerical estimates nor computation. The mystery deepens when we consider the developmental origins of probability judgment: paradoxically, Fontanari et al. claim that infants make accurate probabilistic predictions in tasks that closely resemble those that older preschoolers fail. Why are infants so smart and statisticians so dumb?

Order can be brought to this seeming chaos by considering successive generations of theories of the development of probability judgment, which have each ruled out compelling misconceptions. Many studies show that young children pass “probability-judgment” tasks that only require discrimination of greater-or-lesser magnitude, have clear and memorable instructions, and do not require memory for problem information (i.e., they use external stores).

Early studies often had confounded tasks that made them easier to pass. These tasks could be passed without understanding probability by simply picking whichever option had more of the winning color or tokens, a relative-magnitude judgment. Although understanding ratios is not the only criterion for understanding probability, it has long been considered an essential criterion.

In sum, although earlier theories of probability judgment emphasized formal rules and numerical computation as the zenith of development, Fontanari et al.’s results are consistent with contemporary theory. FTT emphasizes “approximate comparison over precise assessment of possibilities,” placing gist-based intuition at the center of advanced cognition. Given a clear task, it is no wonder that pre-numerate groups without formal schooling can perform subtle probabilistic judgments using qualitative gist. Westerners generally perform these tasks in the same way using nonverbal intuition. Performance of children and adults is modulated by predictable features of the task, notably interference from nested or overlapping sets that must be inhibited; otherwise, reasoners tend to neglect denominators and focus only on relative magnitudes of numerators. Together, these theoretical principles account for the sometimes perplexing heterogeneity of findings regarding probability judgment.

Biologie

GRIMM 2014

David Grimm, *The genes that turned wildcats into kitty cats*. [science 346 \(2014\), 799](#).

Findings help show how all animals became tame.

The researchers uncovered at least 13 genes that changed as cats morphed from feral to friendly. Some of these, based on previous studies of knockout mice, seem to play a role in cognition, including fear responses and the ability to learn new

behaviors when given food rewards. “That jibes with what we know about the domestication of cats,” Montague says, “because they would have needed to become less fearful of new locations and individuals, and the promise of food would have kept them sticking around.”

The team also found five genes in domestic cats that influence the migration of neural crest cells, stem cells in the developing embryo that affect everything from skull shape to coat color. This supports a recent proposal that such cells may be the master control switches of domestication, explaining why domestic animals share common traits, such as smaller brains and certain pigmentation patterns—a mystery first noted by Charles Darwin.

LUKAS 2014

Dieter Lukas¹ & Elise Huchard, *The evolution of infanticide by males in mammalian societies*. [science](#) **346** (2014), 841–844.

[s346-0841-Supplement.pdf](#)

Male mammals often kill conspecific offspring. The benefits of such infanticide to males, and its costs to females, probably vary across mammalian social and mating systems. We used comparative analyses to show that infanticide primarily evolves in social mammals in which reproduction is monopolized by a minority of males. It has not promoted social counterstrategies such as female gregariousness, pair living, or changes in group size and sex ratio, but is successfully prevented by female sexual promiscuity, a paternity dilution strategy. These findings indicate that infanticide is a consequence, rather than a cause, of contrasts in mammalian social systems affecting the intensity of sexual conflict.

SÁNCHEZ-BAYO 2014

Francisco Sánchez-Bayo, *The trouble with neonicotinoids*. [science](#) **346** (2014), 806–807.

Chronic exposure to widely used insecticides kills bees and many other invertebrates.

Mechanisms that underpin chronic neonicotinoid effects on terrestrial and aquatic arthropods include immune suppression and feeding inhibition. While these and other issues are investigated further, current knowledge calls for a re-consideration of current prophylactic seed treatments with neonicotinoids. Such treatments are the main source of soil and water contamination; are often unnecessary, as they either do not increase yields or are not profitable; and go against the principles of integrated pest management.

Energie

LUO 2015

Xing Luo, Jihong Wang, Mark Dooner & Jonathan Clarke, *Overview of current development in electrical energy storage technologies and the application potential in power system operation*. [Applied Energy](#) **137** (2015), 511–536.

Electrical power generation is changing dramatically across the world because of the need to reduce greenhouse gas emissions and to introduce mixed energy sources. The power network faces great challenges in transmission and distribution to meet demand with unpredictable daily and seasonal variations. Electrical Energy Storage (EES) is recognized as underpinning technologies to have great potential in meeting these challenges, whereby energy is stored in a certain state, according to the technology used, and is converted to electrical energy when needed.

However, the wide variety of options and complex characteristic matrices make it difficult to appraise a specific EES technology for a particular application. This paper intends to mitigate this problem by providing a comprehensive and clear picture of the state-of-the-art technologies available, and where they would be suited for integration into a power generation and distribution system. The paper starts with an overview of the operation principles, technical and economic performance features and the current research and development of important EES technologies, sorted into six main categories based on the types of energy stored. Following this, a comprehensive comparison and an application potential analysis of the reviewed technologies are presented.

Keywords: Electrical energy storage | Overview | Power system | Technical and economic performance | features | Application potential

MOSHOVEL 2015

Janina Moshovel et al., *Analysis of the maximal possible grid relief from PV-peak-power impacts by using storage systems for increased self-consumption*. [Applied Energy](#) **137** (2015), 567–575.

Janina Moshovel, Kai-Philipp Kairies, Dirk Magnor, Matthias Leuthold, Mark Bost, Swantje Gahrs, Eva Szczechowicz, Moritz Cramer & Dirk Uwe Sauer

For future energy supply systems the effects and benefits of battery storage systems in households with photovoltaic (PV) generators and the effects on distribution and transmission grids need to be identified and analyzed. The development of grid relieving management strategies for the storage system in due consideration of self-consumption is a necessary step forward in order to analyze the potential of private home battery storage systems to reduce stress on the power supply system. A MATLAB-based model of a lithium-ion storage system has been developed. The model is applicable for a wide range of PV generator sizes, different battery storage systems and diverse management strategies. In order to identify the potential of grid relieving forecast strategies, without discharging the storage into the grid, a management strategy based on persistence forecasts of solar radiation and household load demand has been implemented and analyzed. To minimize forecast uncertainties a proportional plus integral controller has been developed. The persistence forecast management strategy is applicable in real-life PV-batterysystems and due to the simple forecast it is easy to equip existing systems with such a management system with only low effort. As a result it will be shown that a storage system management based on forecasts has a significantly higher potential to relieve the grid than a system that only maximizes self-consumption as it is usually used nowadays. Besides, such a management strategy is able to unload the grid more than a static power reduction to 70% of the nominal power rating according to the current German Renewable Energy Sources Act (EEG). At the same time, the self-consumption can be retained at nearly the same level as by using a management strategy to purely maximize the self-consumption. Even less energy is wasted then with the feed-in limitation.

Keywords: Photovoltaic (PV) | Home storage system | Battery management strategy | Power supply system | Battery modeling

PARRA 2015

David Parra, Mark Gillott, Stuart A. Norman & Gavin S. Walker, *Optimum community energy storage system for PV energy time-shift*. [Applied Energy](#) **137** (2015), 576–587.

A novel method has been designed to obtain the optimum community energy storage (CES) systems for end user applications. The method evaluates the optimum performance (including the round trip efficiency and annual discharge),

levelised cost (LCOES), the internal rate of return and the levelised value of suitable energy storage technologies. A complimentary methodology was developed including three reference years (2012, 2020 and zero carbon year) to show the evolution of the business case during the low carbon transition. The method follows a community approach and the optimum CES system was calculated as a function of the size of the community. In this work, this method was put in practice with lead-acid (PbA) and lithium-ion battery (Li-ion) technologies when performing PV energy time-shift using real demand data from a single home to a 100-home community. The community approach reduced the LCOES down to 0.30 £/kW h and 0.11 £/kW h in 2020 and the zero carbon year respectively. These values meant a cost reduction by 37% and 66% regarding a single home. Results demonstrated that PbA batteries needs from 1.5 to 2.5 times more capacity than Li-ion chemistry to reduce the LCOES, the worst case scenario being for the smallest communities, because the more spiky demand profile required proportionately larger PbA battery capacities.

Keywords: Community energy storage | PV energy time-shift | Lithium-ion battery | Lead-acid battery | Business | Optimization

PEARRE 2015

Nathaniel S. Pearre & Lukas G. Swan, *Technoeconomic feasibility of grid storage, Mapping electrical services and energy storage technologies*. [Applied Energy](#) **137** (2015), 501–510.

Energy storage technologies can provide services to the electricity grid that are necessary for its usability, stability, and reliability. The services, such as power factor correction and renewable energy arbitrage, are defined by duration, cycling occurrence, power, and market price. Storage technologies suitable to these applications, such as pumped hydro and batteries, are defined by their usable energy, power, efficiency, operating range, availability, lifetime, and cost.

In this article, grid services and storage technologies are examined using a range of metrics. Through a series of figures and discussions, the reader is provided with a method for comparing universal characteristics with regional/technology specific values. This provides a guiding strategy to help identify overlap between service needs and storage technology capabilities, so as to aid in the specification and selection of systems for present and future grid storage opportunities.

Keywords: Storage | Energy | Electricity | Battery | Arbitrage | Regulation

RAMAN 2014

Aaswath P. Raman, Marc Abou Anoma, Linxiao Zhu, Eden Rephaeli & Shanhui Fan, *Passive radiative cooling below ambient air temperature under direct sunlight*. [nature](#) **515** (2014), 540–544.

Cooling is a significant end-use of energy globally and a major driver of peak electricity demand. Air conditioning, for example, accounts for nearly fifteen per cent of the primary energy used by buildings in the United States¹. A passive cooling strategy that cools without any electricity input could therefore have a significant impact on global energy consumption. To achieve cooling one needs to be able to reach and maintain a temperature below that of the ambient air. At night, passive cooling below ambient air temperature has been demonstrated using a technique known as radiative cooling, in which a device exposed to the sky is used to radiate heat to outer space through a transparency window in the atmosphere between 8 and 13 micrometres^{2–11}. Peak cooling demand, however, occurs during the daytime. Daytime radiative cooling to a temperature below ambient of a surface under direct sunlight has not been achieved^{3,4,12,13} because sky access during the day results in heating of the radiative cooler by the Sun. Here, we experimentally

demonstrate radiative cooling to nearly 5 degrees Celsius below the ambient air temperature under direct sunlight. Using a thermal photonic approach^{14–25}, we introduce an integrated photonic solar reflector and thermal emitter consisting of seven layers of HfO₂ and SiO₂ that reflects 97 per cent of incident sunlight while emitting strongly and selectively in the atmospheric transparency window. When exposed to direct sunlight exceeding 850 watts per square metre on a rooftop, the photonic radiative cooler cools to 4.9 degrees Celsius below ambient air temperature, and has a cooling power of 40.1 watts per square metre at ambient air temperature. These results demonstrate that a tailored, photonic approach can fundamentally enable new technological possibilities for energy efficiency. Further, the cold darkness of the Universe can be used as a renewable thermodynamic resource, even during the hottest hours of the day.

YANG 2014

Yuan Yang, Seok Woo Lee, Hadi Ghasemi, James Loomis, Xiaobo Li, Daniel Kraemer, Guangyuan Zheng, Yi Cui & Gang Chen, *Charging-free electrochemical system for harvesting low-grade thermal energy*. [PNAS 111 \(2014\), 17011–17016](#).

Efficient and low-cost systems are needed to harvest the tremendous amount of energy stored in low-grade heat sources (<100 °C). Thermally regenerative electrochemical cycle (TREC) is an attractive approach which uses the temperature dependence of electrochemical cell voltage to construct a thermodynamic cycle for direct heat-to-electricity conversion. By varying temperature, an electrochemical cell is charged at a lower voltage than discharge, converting thermal energy to electricity. Most TREC systems still require external electricity for charging, which complicates system designs and limits their applications. Here, we demonstrate a charging-free TREC consisting of an inexpensive soluble Fe(CN)₆ [3-/4-] redox pair and solid Prussian blue particles as active materials for the two electrodes. In this system, the spontaneous directions of the full-cell reaction are opposite at low and high temperatures. Therefore, the two electrochemical processes at both low and high temperatures in a cycle are discharge. Heat-to-electricity conversion efficiency of 2.0% can be reached for the TREC operating between 20 and 60 °C. This charging-free TREC system may have potential application for harvesting low-grade heat from the environment, especially in remote areas.

waste heat harvesting | Prussian blue analog | nanomaterials | batteries

Klima

ARMIT 2014

Ian Armit, Graeme T. Swindles, Katharina Becker, Gill Plunkett & Maarten Blaauw, *Rapid climate change did not cause population collapse at the end of the European Bronze Age*. [PNAS 111 \(2014\), 17045–17049](#).

[pnas111-17045-Supplement1.xlsx](#), [pnas111-17045-Supplement2.xlsx](#)

The impact of rapid climate change on contemporary human populations is of global concern. To contextualize our understanding of human responses to rapid climate change it is necessary to examine the archeological record during past climate transitions. One episode of abrupt climate change has been correlated with societal collapse at the end of the northwestern European Bronze Age. We apply new methods to interrogate archeological and paleoclimate data for this transition in Ireland at a higher level of precision than has previously been possible. We

analyze archeological ^{14}C dates to demonstrate dramatic population collapse and present high-precision proxy climate data, analyzed through Bayesian methods, to provide evidence for a rapid climatic transition at ca. 750 calibrated years B.C. Our results demonstrate that this climatic downturn did not initiate population collapse and highlight the nondeterministic nature of human responses to past climate change.

climate change | demography | prehistory | Bronze Age | radiocarbon dating

MCKAY 2014

Robert McKay, *Did Antarctica initiate the ice age cycles?* [science](#) **346** (2014), 812–813.

Gradual buildup of Antarctic ice sheets preceded extensive Northern Hemisphere glaciation about 3 million years ago.

This capping of the Southern Ocean may have led to numerous other possible feedbacks that could have contributed to Late Pliocene cooling. For example, reduced ventilation of the deep waters around Antarctica may have caused more atmospheric CO_2 . Indeed, paleorecords indicate that atmospheric CO_2 levels fell from above 400 ppm to below 280 ppm in the Late Pliocene, with the sharpest decline near 2.7 million years ago—a threshold considered key for the triggering of the Northern Hemisphere glaciation. Also, a steepened pole-to-equator temperature gradient resulting from the Antarctic cooling may have led to a contraction of the Southern Hemisphere subtropical gyres, reducing heat and salt exchange between the major ocean basins by surface ocean currents.

WOODARD 2014

Stella C. Woodard, Yair Rosenthal, Kenneth G. Miller, James D. Wright, Beverly K. Chiu & Kira T. Lawrence, *Antarctic role in Northern Hemisphere glaciation.* [science](#) **346** (2014), 847–851.
[s346-0847-Supplement.pdf](#)

Earth's climate underwent a major transition from the warmth of the late Pliocene, when global surface temperatures were $\approx 2^\circ$ to 3°C higher than today, to extensive Northern Hemisphere glaciation (NHG) ≈ 2.73 million years ago (Ma). We show that North Pacific deep waters were substantially colder (4°C) and probably fresher than the North Atlantic Deep Water before the intensification of NHG. At ≈ 2.73 Ma, the Atlantic-Pacific temperature gradient was reduced to $< 1^\circ\text{C}$, suggesting the initiation of stronger heat transfer from the North Atlantic to the deep Pacific. We posit that increased glaciation of Antarctica, deduced from the 21 ± 10 meter sea-level fall from 3.15 to 2.75 Ma, and the development of a strong polar halocline fundamentally altered deep ocean circulation, which enhanced interhemispheric heat and salt transport, thereby contributing to NHG.

Kultur

ROSENBERG 2014

Danny Rosenberg & Dani Nadel, *The Sounds of Pounding, Boulder Mortars and Their Significance to Natufian Burial Customs.* [Current Anthropology](#) **55** (2014), 784–812.

Comments by Anna Belfer-Cohen and A. Nigel Goring-Morris, Fanny Bocquentin, Nicholas J. Conard, Brian Hayden, Juan José Ibáñez, Lisa Maher, Yoshihiro Nishiaki, Deborah I. Olszewski & Tobias Richter

Burial and commemorative rites form significant components of many routines and activities accompanying the disposal and remembrance of the dead in numerous past and present societies. Various artifacts seem to have had an important role in burial and commemorative rituals and may have been used to reflect social unity and strengthen group identity. Burial-related paraphernalia clearly gained special importance in the southern Levant with the onset of the Natufian culture (ca. 15,000–11,500 calBP), a culture exhibiting cardinal changes in subsistence economy, social behavior, and symbolism. One hallmark of this culture is the appearance of large boulder mortars, massive implements frequently associated with burials and burial grounds, long accepted as a manifestation of technological skill and petrological knowledge. We report the results of a new study of Natufian boulder mortars and their contexts and present novel relevant data. Our conclusions suggest that Natufian boulder mortars share specific traits that go beyond size as well as use contexts. We suggest that they reflect common practices pertaining to Natufian burial and commemorative ceremonies and can be held as indicators of a south Levantine tradition overriding a variety of territorial and group-specific social and symbolic traits.

WHITEHOUSE 2014

Harvey Whitehouse & Jonathan A. Lanman, *The Ties That Bind Us, Ritual, Fusion, and Identification*. *Current Anthropology* **55** (2014), 674–695.

Comments by Greg Downey, Leah A. Fredman and William B. Swann Jr., Daniel H. Lende, Robert N. McCauley, David Shankland, Michael Stausberg & Dimitris Xygalatas

Most social scientists endorse some version of the claim that participating in collective rituals promotes social cohesion. The systematic testing and evaluation of this claim, however, has been prevented by a lack of precision regarding the nature of both “ritual” and “social cohesion” as well as a lack of integration between the theories and findings of the social and evolutionary sciences. By directly addressing these challenges, we argue that a systematic investigation and evaluation of the claim that ritual promotes social cohesion is achievable. We present a general and testable theory of the relationship between ritual, cohesion, and cooperation that more precisely connects particular elements of “ritual,” such as causal opacity and emotional arousal, to two particular forms of “social cohesion”: group identification and identity fusion. Further, we ground this theory in an evolutionary account of why particular modes of ritual practice would be adaptive for societies with particular resource-acquisition strategies. In setting out our conceptual framework, we report numerous ongoing investigations that test our hypotheses against data from controlled psychological experiments as well as from the ethnographic, archaeological, and historical records.

Politik

MONTEIRO 2014

Nuno P. Monteiro & Alexandre Debs, *The Strategic Logic of Nuclear Proliferation*. *International Security* **39** (2014), ii, 7–51.

This article has introduced a security-based theory of nuclear proliferation focusing on the strategic interaction between a state, its enemies, and, where present, allies. We conclude that only two types of states acquire the bomb: powerful but highly threatened states; and weaker states whose territory is protected by an ally they deem unlikely to remain present in the long-term or unwilling to ensure its

other core security goals. The empirical rarity of these strategic situations is responsible for the relatively low number of states—fewer than 5 percent—that have acquired the bomb during the first seven decades of the nuclear age. This finding questions frequent claims that nuclear weapons are the “weapon of the weak,” the “great equalizer” in international relations. No doubt, nuclear weapons would enable an otherwise weak nation to stand up to more powerful adversaries. So far, however, no weak unprotected nation has ever managed to obtain them.

Today Iran is at the center of U.S. proliferation concerns. As a relatively weak state involved in an adversarial relationship with the United States, Israel, and Sunni Arab states, and in the absence of a powerful ally, Iran is likely to possess the willingness to build nuclear weapons. A nuclear deterrent would make the Iranian regime virtually immune to foreign threats to its survival and might boost its bargaining position on other security issues. Yet, at the same time, our theory makes clear why Iran is unlikely to have the opportunity to nuclearize. For Tehran to acquire nuclear weapons, its adversaries must estimate the security benefit of Iranian proliferation to be lower than the cost of a preventive strike. Otherwise, a preventive strike is a rational option, and either Iran internalizes this threat and abandons its nuclear investment or its program is likely to be targeted. It should therefore come as no surprise that both U.S. and Israeli leaders have refused to take the military option off the table during negotiations with Iran over its nuclear program. Our theory predicts that, either through a comprehensive nuclear deal or as the result of a preventive strike, Iran will remain a nonnuclear weapons state.

Furthermore, our theory provides reasons to doubt the widespread fear that eventual Iranian nuclearization would trigger a proliferation cascade in the Middle East involving Egypt, Saudi Arabia, or Turkey. As the South Korean case demonstrates, none of these states is likely to pursue nuclear weapons as long as they continue to possess reliable U.S. security guarantees. At the same time, as the Pakistani case demonstrates, to persuade its allies to drop their nuclear ambitions, Washington must place nonproliferation at the top of its agenda. In the past, the United States has consistently succeeded in preventing clients from nuclearizing whenever it shared their security goals and privileged nonproliferation efforts over other strategic goals. This success is, to a great extent, responsible for the historical absence of “reactive proliferation.” We have no doubt that U.S. administrations will continue to place great importance on these states’ security vis-à-vis a putative Iranian nuclear threat. Given the evolving nature of the Egyptian, Saudi, and Turkish regimes, however, it is less clear that Washington will be able to continue to prioritize the goal of nonproliferation above all of its other policy goals vis-à-vis these states. In any case, our theory highlights an important cost that the United States often pays to ensure the nonnuclear status of its allies: offering security guarantees to a burgeoning number of states. Whether the United States will be able to continue to do so will have a great impact on the odds of future nuclear proliferation.