

References

Afrika

SMITH 2016

Alexandre Livingstone Smith, *Pottery and Politics: Making Sense of Pottery Traditions in Central Africa*. [Cambridge Archaeological Journal](#) **26** (2016), 471–491.

The multiscale analysis of pottery traditions in south central Africa opens a new perspective on the study of ancient polities. Focusing on an area of central Africa known for the existence of great kingdoms, I show how past political entities have left lingering traces in the cultural landscape and, more specifically, in the pottery traditions. As ceramics are one of the major tools in the archaeological arsenal, the way they can be related to political structures is of interest to archaeologists around the world. Analysing the chaîne opératoire of living pottery traditions, at an individual and regional level, I characterize the geographic extent of a series of technical behaviours. These technical domains fit with other aspects of society such as languages or matrimonial strategies, but also with economic and political aspects such as salt making and distribution networks and past political entities. They are the materialization of resilient social spaces created by ancient political entities.

WINCHELL 2017

Frank Winchell, Chris J. Stevens, Charlene Murphy, Louis Champion & Dorian Q. Fuller, *Evidence for Sorghum Domestication in Fourth Millennium BC Eastern Sudan, Spikelet Morphology from Ceramic Impressions of the Butana Group*. [Current Anthropology](#) **58** (2017), 673–683.

[CurrAnth58-673-Supplement.pdf](#)

Since the 1970s, the quest for finding the origins of domesticated sorghum in Africa has remained elusive despite the fact that sorghum (*Sorghum bicolor* (L.) Moench. sensu stricto) is one of the world's most important cereals. Recognized as originating from wild populations in Africa (*Sorghum arundinaceum* (Desv.) Stapf), however, the date and cultural context of its domestication has been controversial, with many scholars inferring an early Holocene origin in parallel with better-known cereal domestications. This paper presents firm evidence that the process of domesticating sorghum was present in the far eastern Sahel in the southern Atbai at an archaeological site associated with the Butana Group. Ceramic sherds recovered from excavations undertaken by the Southern Methodist University Butana Project during the 1980s from the largest Butana Group site, KG23, near Kassala, eastern Sudan, were analyzed, and examination of the plant impressions in the pottery revealed diagnostic chaff in which both domesticated and wild sorghum types were identified, thus providing archaeobotanical evidence for the beginnings of cultivation and emergence of domesticated characteristics within sorghum during the fourth millennium BC in eastern Sudan.

Aktuell

EDITORIAL 2017

Spread your wings. [nature 550 \(2017\), 429.](#)

Most PhD students who love what they do and who want a career in academic research will find that it's not so easy. Someone needs to help them find out what other sectors have to offer.

GOOP 2017

Joel Goop, Mikael Odenberger & Filip Johnsson, *The effect of high levels of solar generation on congestion in the European electricity transmission grid.* [Applied Energy 205 \(2017\), 1128–1140.](#)

The increasing levels of solar power affect the usage and development of electricity grids, both at local distribution level and with respect to potential congestion within the transmission grid. We use a cost-minimising investment model (ELIN) to determine the development of the European electricity generation system up to Year 2050, for two renewable-dominated scenarios: the Green Base scenario, with a Europe-wide, technology-neutral renewable certificate scheme; and the Net Metering scenario, with an additional net metering support scheme for solar power. The system compositions are extracted from the ELIN results for the years 2022 and 2032, and analysed in an hourly dispatch model (EPOD) to study the effects of solar power on marginal electricity costs and transmission congestion. From the results of the investment model, it is clear that the presence of a net metering subsidy scheme significantly affects both the pace at which solar power continues to expand and the geographical distribution of the new capacity. In the dispatch modelling, it can be seen that high penetration levels of solar power have a strong effect on the marginal costs of electricity, since production is concentrated around a few hours each day. At penetration levels of 20–30 % of annual electricity demand, solar power production entails a predictable daily marginal cost difference between the solar peak and the evening price peak, which could make short-term storage competitive. Transmission congestion during summer is consistently higher in the systems from the Net Metering scenario than in those from the Green Base scenario, while the opposite is true during winter. Solar power production correlates strongly with congestion 6–9 h after the solar peak, whereas wind power correlates with congestion with respect to more slowly evolving and longer-term variations.

Highlights:

- We study transmission congestion in Europe with high levels of solar and wind power.
- Solar has a greater impact on the marginal cost of electricity than wind power.
- At solar power penetration levels >20 %, battery storage becomes competitive.
- Solar power correlates strongly with congestion 6–9 h after the solar peak.
- Wind power correlates with longer-term variations in congestion.

Keywords: Transmission grid | Congestion | Solar power | Variable renewables

WILSON 2017

Mark Wilson, *The Hometown of Santa Claus.* [Biblical Archaeology Review 43 \(2017\), vi, 22–24, 64.](#)

Often bypassed by groups because it is out of the way, Myra (modern Demre) is a two-hour scenic drive through the Taurus Mountains and along the Mediterranean coast from Antalya. The international airport at Antalya makes it an ideal jumping-off point for your excursion.

Accommodations in Demre are limited to only one hotel, but 45 minutes west is the picturesque coastal town of Kas (pronounced Kash), ancient Antiphellos. Plan to stay a couple of nights, for Myra and its surrounding area are so archaeologically rich that it takes several days to see everything.

WOOLSTON 2017

Chris Woolston, *A love–hurt relationship*. [nature](#) **550** (2017), 549–552.

Nature’s 2017 PhD survey reveals that, despite many problems with doctoral programmes, PhD students are as committed as ever to pursuing research careers.

ZISSU 2017

Boaz Zissu, Eitan Klein, Roi Porat, Boaz Langford & Amos Frumkin, *Roman Cult and Jewish Rebels Share Jerusalealem Cave Site*. [Biblical Archaeology Review](#) **43** (2017), vi, 30–39.

The Te’omim Cave is a large and complex cave on the western edge of the Jerusalem hills. Caves in the Judean Desert were used for refuge purposes during the Bar-Kokhba Revolt. But the Te’omim Cave, a natural cave situated in the settled part of Judea just outside Jerusalem, was also used for this purpose. Three hoards of coins, weapons and pottery vessels were hidden in the difficult-to-access inner chambers by Jewish insurgents who found refuge in the Te’omim Cave at the end of the revolt.

We should keep in mind that rather than mint new coins, the rebels’ administration overstruck Roman ones, a blatant declaration of sovereignty—as clearly shown by all the coins found in Hoard A. Presumably, the owners of this hoard supported the revolt since they submitted to the Bar-Kokhba minting authorities all the coins in their possession to be overstruck. In contrast, the owners of the two other hoards were more cautious; they decided to have only a few of their coins overstruck since such insurgent coins were valid tender only in areas controlled by the rebels. This may indicate that some residents preferred to keep the Roman coins that could always be used for obtaining provisions in areas beyond the rebels’ control. Aside from the sporadic finds from the BarKokhba Revolt, Hall F was empty. It seems that this hall served as the last hidden, very-hard-to-reach place of refuge—at a time of extreme distress—for a group of people who were very familiar with the secrets of the cave.

The Te’omim Cave thus provides a window into the ethnic and cultural changes in rural Judea after the Bar-Kokhba Revolt—when the Jews abandoned the region, and the area was occupied by pagan settlers of various origins.

Altpaläolithikum

SHEA 2017

John J. Shea, *Occasional, obligatory, and habitual stone tool use in hominin evolution*. [Evolutionary Anthropology](#) **26** (2017), 200–217.

Archeologists have long assumed that earlier hominins were obligatory stone tool users. This assumption is deeply embedded in traditional ways of describing the lithic record. This paper argues that lithic evidence dating before 1.7 Ma reflects occasional stone tool use, much like that practiced by nonhuman primates except that it involved flaked-stone cutting tools. Evidence younger than 0.3 Ma is more congruent with obligatory stone tool use, like that among recent humans. The onset of habitual stone tool use at about 1.7 Ma appears correlated with increased hominin logistical mobility (carrying things). The onset of obligatory stone tool use after 0.3 Ma may be linked to the evolution of spoken language. Viewing

the lithic evidence dating between 0.3-1.7 Ma as habitual stone tool use explains previously inexplicable aspects of the Early-Middle Pleistocene lithic record.

Keywords: archaeology | Early-Middle Pleistocene | stone tools | technological primates | Modes A-I

TENNIE 2017

Claudio Tennie, L. S. Premo, David R. Braun & Shannon P. McPherson, *Early Stone Tools and Cultural Transmission, Resetting the Null Hypothesis*. *Current Anthropology* **58** (2017), 652–672.

We have learned much about tool use in nonhumans since the discovery of Oldowan stone tools. Despite the ongoing debate over whether tool use in other animals requires cultural transmission, it seems clear that, today, humans show a quantitative, if not qualitative, difference in our ability to transmit information socially through cultural transmission. This ability makes cumulative culture possible. Although comparative studies provide relevant insights, we must look to the Paleolithic archaeological record to address when, where, and ultimately why this shift to high-fidelity social learning occurred. Yet here the frequent assumption that even the earliest stone tools serve as evidence of high-fidelity cultural transmission hinders investigation more than it helps. We pragmatically suggest resetting the null hypothesis for the processes underlying early stone tool production. The null hypothesis that we prefer is that early stone tools might have been so-called latent solutions rather than cultural material that derived from—and depended upon—modern humanlike high-fidelity cultural transmission. This simple shift in perspective prioritizes the systematic investigation of more parsimonious potential explanations and forces us to demonstrate, rather than presume, that stone tools could not have existed without high-fidelity cultural transmission.

Anthropologie

HARRIS 2017

Eugene E. Harris, *Demic and cultural diffusion in prehistoric Europe in the age of ancient genomes*. *Evolutionary Anthropology* **26** (2017), 228–241.

Ancient genomes can help us detect prehistoric migrations, population contractions, and admixture among populations. Knowing the dynamics of demography is invaluable for understanding culture change in prehistory, particularly the roles played by demic and cultural diffusion in transformations of material cultures. Prehistoric Europe is a region where ancient genome analyses can help illuminate the interplay between demography and culture change. In Europe, there is more archaeological evidence, in terms of detailed studies, radiometric dates, and explanatory hypotheses that can be evaluated, than in any other region of the world. Here I show some important ways that ancient genomes have given us insights into population movements in European prehistory. I also propose that studies might be increasingly focused on specific questions of culture change, for example in evaluating the makers of “transitional” industries as well as the origins of the Gravettian and spread of the Magdalenian. I also discuss genomic evidence supporting the large role that demic expansion has played in the Neolithization of Europe and the formation of the European population during the Bronze Age.

Keywords: ancient genomes | demic and cultural diffusion | Neolithic transition | Upper Paleolithic

Archäologie

CLARKE 1973

David Clarke, *Archaeology, The loss of innocence*. [Antiquity 47 \(1973\), 6–18](#).

We published last year two articles dealing with the aims and relevance of the so-called ‘new archaeology’: the first was by Professor Richard Watson (1972, 210–15) and the second by A. C. Hogarth (1972, 301–4). We also published a review by David Clarke of ‘Explanation in archaeology’ by P. J. Watson, S. A. LeBlanc and C. L. Redman (1972, 237–9). Here, Dr David Clarke, Fellow and Tutor of Peterhouse, Cambridge, sets out his considered views on the name and nature of archaeology, some of which he has already discussed in his book ‘Analytical archaeology’.

DALTON 1961

George Dalton, *Economic Theory and Primitive Society*. [American Anthropologist 63 \(1961\), 1961, 1–25](#).

This paper presents some reasons why economic theory cannot be fruitfully applied to the study of primitive communities and suggests an alternative approach to analytical treatment of primitive economy.

EARLE 1987

Timothy K. Earle, *Chieftoms in Archaeological and Ethnohistorical Perspective*. [Annual Review of Anthropology 16 \(1987\), 279–308](#).

The notion of an intermediate-level society as captured in chiefdoms has a continuing role in our studies of cultural evolution. Our conception of chiefdoms from Service (199) has been transformed by a recognition of political and ideological bases that replace an earlier determinism with a new dynamism. The variation in chiefdoms is considerable and the causes of their evolution are complicated, but the chiefdom represents a reasonable demarcation of variation for use in comparative studies.

HODDER 1985

Ian Hodder, *Postprocessual Archaeology*. [Advances in Archaeological Method and Theory 8 \(1985\), 1–26](#).

That Binford and new archaeologists, among whom I include the authors of *Spatial Analysis in Archaeology*, did or do not allow generalizations about meaningful social action and do not allow explanation without prediction is, in my view, because they are caught within a language and a coping system that is based on technical control. I have tried in this essay to sketch out an alternative approach. By emphasizing the meaningful construction of social acts and the historical particularity of human culture I seek to dissolve the timeless past both in its role as the ultimate legitimation of the modern technocratic West and in its function as the prop of the professional theoretician.

RENFREW 1970

Colin Renfrew, *New configurations in Old World archaeology*. [World Archaeology 2 \(1970\), 199–211](#).

Recent developments in radiocarbon dating now show that our conventional dates for Neolithic and Early Bronze Age periods of Europe are wildly wrong. In some cases indeed the new dates significantly alter the chronological relationship between one area and another. The Wessex culture of south Britain, for example,

formerly dated to the period of the Mycenaean civilization of Greece, had ended before the latter began. Similar changes are seen in other regions.

The present paper tries first to outline how these changes arise, and what their effect is likely to be on European chronology.

Their very magnitude highlights, however, several inadequacies in the way we, as prehistorians, have been working; in the last section an attempt is made to draw a moral.

Bibel

FRANKLIN 2017

Norma Franklin, Jennie Ebeling, Philippe Guillaume & Deborah Apler, *Have We Found Naboth's Vineyard at Jezreel?* [Biblical Archaeology Review](#) **43** (2017), vi, 49–54.

Jezreel in Naboth's time was a military center and probably the main mustering station for Ahab's chariot force. For Jezreel to be capable of producing its own wine to provide the troops with their rations would have been a huge asset, one that any king would want to control. Strangely, the Biblical narrative relates that Ahab wanted to purchase the vineyard in order to turn it into a vegetable garden, but this makes no sense when we know the importance of viticulture at that time. Perhaps this was just Ahab's effort to get Naboth to sell—and cheaply.

The Jezreel winery's location east of Jezreel and near the ancient highway accords with the account in 2 Kings 9 and prompts the question: Have we excavated physical evidence of Naboth's vineyard? While we can't make this claim with complete certainty, we suggest that when the Biblical account of Naboth's vineyard was composed, the writers were familiar with the topographical reality of greater Jezreel and the location of the prominent winery complex northeast of Tel Jezreel. On a more prosaic note, the rich soil of the agricultural terrace just north of the winery was recently analyzed and found to be suitable for viticulture, while in contrast the fields to the west were found to be better suited to growing olives. Even if it cannot be securely attributed to Naboth the Jezreelite, the excavated Jezreel winery reflects the reality on the ground as described so vividly in 2 Kings.

GANOR 2017

Saar Ganor & Igor Kreimerman, *Going to the Bathroom at Lachish.* [Biblical Archaeology Review](#) **43** (2017), vi, 56–60.

The practice of destroying a cultic center and transforming it into a latrine is known in the Hebrew Bible, where the shrine of Baal in Samaria was destroyed by King Jehu as described in 2 Kings 10:27: "Then they demolished the pillar of Baal, and destroyed the temple of Baal, and made it a latrine to this day."

The evidence from the Lachish shrine joins the well-known cases of the abolishment of the temple of Arad and the demolition of the altar at Beer-Sheva that are also attributed to Hezekiah's cultic reform by their excavators. The Iron Age gate at Lachish is one of the largest gates that has ever been excavated in the Land of Israel. And, this is the first time that a gate-shrine has been discovered in Israel during an archaeological excavation. The gate-shrine went out of use during the end of the eighth century B.C.E. and was made ritually impure.

ROLLSTON 2017

Christopher A. Rollston, *Epigraphic Evidence from Jerusalem and its Environs at the Dawn of Biblical History, Methodologies and a Long*

Durèe Perspective. In: YUVAL GADOT, YEHIEL ZELINGER, KATIA CYTRYN-SILVERMAN & JOSEPH (JOE) UZIEL (Hrsg.), *New Studies in the Archaeology of Jerusalem and its Region*. Collected Papers 11 ([Jerusalem 2017](#)), 7–20.

At this time, it is clear that the verdict is in. There was writing and reading in Jerusalem and its environs in Iron IIA. And this tradition of writing and reading in the southern Levant at that time is part of a long and deep tradition, with antecedents so prominent in the centuries prior to Iron IIA and with the continuation of that scribal tradition after Iron IIA. It is not something *de novo*. There is just no other way to account for the totality of the evidence. To be sure, I am certain that some will contest this. And I am sure that some will continue to attempt to finesse the dating of materials in some fashion. That is fine. That is the essence of scholarship. And I wish that we had more pieces of the puzzle. The future will certainly bring more stunning finds. But even at this time, the number of inscriptions, the general quality of the inscriptions, and the persistence of the scribal output in the southern Levant through the centuries all converge so as to demonstrate nicely the presence of scribalism in Iron IIA. It is part of a long and deep scribal tradition. Thus, I think that the best conclusion, based on the actual data, is this: there was writing in Jerusalem and its environs in Iron IIA. We know this. We have texts to prove it.

STERN 2017

Ephraim Stern, *Phoenicia and Its Special Relationship with Israel*. [Biblical Archaeology Review](#) **43** (2017), vi, 40–48.

The Phoenicians were the nearest people to the ancient Israelites in every respect. They spoke the same language and wrote in the same script. Even their religion was similar, at least during the First Temple period. The Phoenicians and the Israelites built Jerusalem together, as well as several other cities, and they went on joint trading expeditions. By marriage, Phoenician royal houses and those of Israel and Judea were related. The clearest sign of the close relationship between the two peoples must have been the fact that they never went to war against each other (in complete contrast to the Israelites' relationship with all their other neighbors).

The Phoenicians were the late Canaanites of the first millennium B.C.E. (Iron Age through Roman period), descendants of the Canaanites of the second millennium B.C.E. Throughout their existence, the Phoenicians encountered numerous groups. With some of these groups, they competed, and with others, they warred. With almost all, they traded—exporting their culture and their goods throughout the Mediterranean world. Yet their relationship with the Israelites was distinct from all the others. It should not surprise us that when the kingdom of Israel fell, the Phoenicians suffered, too. The loss of their close neighbor and ally disrupted the growth and strength of the Phoenician empire.

Biologie

DEAMER 2017

David Deamer, *Darwin's prescient guess*. [PNAS](#) **114** (2017), 11264–11265.

To summarize, Pearce et al. (1) have made an imaginative attempt to differentiate between WLP and the ocean in terms of plausible conditions that would be conducive to the origin of life. Some researchers will find their argument to be thoughtprovoking, while others will consider the number of assumptions involved

and will be tempted to dismiss the results as mere speculation. My impression is that Pearce et al. make every effort to base their calculations on facts and logic. They are venturing into a huge gap in our understanding of the origin of life, and the first attempt to fill such a gap will stand until others can eliminate one or more of the underlying assumptions by demonstrating impossibility, or at least by proposing a more plausible narrative. Pearce et al. have thrown down the gauntlet. Perhaps the most testable claim is that the RNA world began in the fresh water of a hydrothermal pond rather than in salty sea water. There is experimental evidence that RNA-like polymers can be synthesized in cycling fresh-water conditions, so the proponents of hydrothermal vents must show by experiment that RNA can also be synthesized in the hot, salty seawater.

HALLMANN 2017

Caspar A. Hallmann et al., *More than 75 percent decline over 27 years in total flying insect biomass in protected areas*. [PLoS ONE 12 \(2017\), e185809](#). DOI:10.1371/journal.pone.0185809.

pone12-e0185809-Supplement01.pdf, pone12-e0185809-Supplement02.pdf, pone12-e0185809-Supplement03.pdf, pone12-e0185809-Supplement04.csv, pone12-e0185809-Supplement05.csv, pone12-e0185809-Supplement06.png, pone12-e0185809-Supplement07.pdf, pone12-e0185809-Supplement08.pdf, pone12-e0185809-Supplement09.pdf, pone12-e0185809-Supplement10.pdf, pone12-e0185809-Supplement11.pdf, pone12-e0185809-Supplement12.pdf, pone12-e0185809-Supplement13.pdf

Caspar A. Hallmann, Martin Sorg, Eelke Jongejans, Henk Siepel, Nick Hofland, Heinz Schwan, Werner Stenmans, Andreas Müller, Hubert Sumser, Thomas Hören, Dave Goulson & Hans de Kroon

Global declines in insects have sparked wide interest among scientists, politicians, and the general public. Loss of insect diversity and abundance is expected to provoke cascading effects on food webs and to jeopardize ecosystem services. Our understanding of the extent and underlying causes of this decline is based on the abundance of single species or taxonomic groups only, rather than changes in insect biomass which is more relevant for ecological functioning. Here, we used a standardized protocol to measure total insect biomass using Malaise traps, deployed over 27 years in 63 nature protection areas in Germany (96 unique location-year combinations) to infer on the status and trend of local entomofauna. Our analysis estimates a seasonal decline of 76 %, and mid-summer decline of 82 % in flying insect biomass over the 27 years of study. We show that this decline is apparent regardless of habitat type, while changes in weather, land use, and habitat characteristics cannot explain this overall decline. This yet unrecognized loss of insect biomass must be taken into account in evaluating declines in abundance of species depending on insects as a food source, and ecosystem functioning in the European landscape.

PEARCE 2017

Ben K. D. Pearce, Ralph E. Pudritz, Dmitry A. Semenov & Thomas K. Henning, *Origin of the RNA world, The fate of nucleobases in warm little ponds*. [PNAS 114 \(2017\), 11327–11332](#).

Before the origin of simple cellular life, the building blocks of RNA (nucleotides) had to form and polymerize in favorable environments on early Earth. At this time, meteorites and interplanetary dust particles delivered organics such as nucleobases (the characteristic molecules of nucleotides) to warm little ponds whose wet-dry cycles promoted rapid polymerization. We build a comprehensive numerical model for the evolution of nucleobases in warm little ponds leading to the

emergence of the first nucleotides and RNA. We couple Earth's early evolution with complex prebiotic chemistry in these environments. We find that RNA polymers must have emerged very quickly after the deposition of meteorites (less than a few years). Their constituent nucleobases were primarily meteoritic in origin and not from interplanetary dust particles. Ponds appeared as continents rose out of the early global ocean, but this increasing availability of "targets" for meteorites was offset by declining meteorite bombardment rates. Moreover, the rapid losses of nucleobases to pond seepage during wet periods, and to UV photodissociation during dry periods, mean that the synthesis of nucleotides and their polymerization into RNA occurred in just one to a few wet-dry cycles. Under these conditions, RNA polymers likely appeared before 4.17 billion years ago.

Keywords: life origins | astrobiology | planetary science | meteoritics | RNA world

Significance: There are currently two competing hypotheses for the site at which an RNA world emerged: hydrothermal vents in the deep ocean and warm little ponds. Because the former lacks wet and dry cycles, which are well known to promote polymerization (in this case, of nucleotides into RNA), we construct a comprehensive model for the origin of RNA in the latter sites. Our model advances the story and timeline of the RNA world by constraining the source of biomolecules, the environmental conditions, the timescales of reaction, and the emergence of first RNA polymers.

Datierung

WENINGER 1992

B. Weninger, *Fallstudien zur 14-C Chronologie in Bulgarien*. [Studia Praehistorica](#) **12** (1992), 407–422.

Während 14C Daten allgemein die Tendenz haben, sich auf der 14C Skala artifiziell gegenüber den flachen Bereichen der Kalibrationskurve zu häufen, neigen die Ablesungen von Einzeldaten umgekehrt dazu, sich künstlich in den steilen Bereichen der Kalibrationskurve festzusetzen, ein Effekt, den wir als „Quantisierung der 14C-Chronologie“ bezeichnen. Die Sprunghaftigkeit der stratigraphisch jüngsten Daten in Abb. 1 kann also artifiziell sein und ist teilweise darauf zurückzuführen, daß die Daten an den nach unten und oben weisenden Wiggles der Kalibrationskurve „hängenbleiben“, was dann schließlich zu wohldefinierten Versetzungen der Ablesungen führt. Die hier verwendete Methode der 2-D Dispersionskalibration minimiert diesen Effekt, der besonders stark bei der einfachen Methode der Intervallkalibration auftritt und Verfälschungen bis zu 200 Jahren verursachen kann.

Klima

FEULNER 2017

Georg Feulner, *Formation of most of our coal brought Earth close to global glaciation*. [PNAS](#) **114** (2017), 11333–11337.

The bulk of Earth's coal deposits used as fossil fuel today was formed from plant debris during the late Carboniferous and early Permian periods. The high burial rate of organic carbon correlates with a significant drawdown of atmospheric carbon dioxide (CO₂) at that time. A recent analysis of a high-resolution record reveals large orbitally driven variations in atmospheric CO₂ concentration between ≈ 150 and 700 ppm for the latest Carboniferous and very low values of 100 ± 80

ppm for the earliest Permian. Here, I explore the sensitivity of the climate around the Carboniferous/ Permian boundary to changes in Earth's orbital parameters and in atmospheric CO₂ using a coupled climate model. The coldest orbital configurations are characterized by large axial tilt and small eccentricities of Earth's elliptical orbit, whereas the warmest configuration occurs at minimum tilt, maximum eccentricity, and a perihelion passage during Northern hemisphere spring. Global glaciation occurs at CO₂ concentrations <40 ppm, suggesting a rather narrow escape from a fully glaciated Snowball Earth state given the low levels and large fluctuations of atmospheric CO₂. These findings highlight the importance of orbital cycles for the climate and carbon cycle during the late Paleozoic ice age and the climatic significance of the fossil carbon stored in Earth's coal deposits.

Keywords: paleoclimate | Carboniferous | Permian | glaciation | coal

Significance: The bulk of the coal driving the Industrial Revolution and contributing to global warming today has been deposited during the Carboniferous period (359–299 million years ago), resulting in a significant drawdown of atmospheric carbon dioxide at that time. In this work, a combination of climate model simulations and recent estimates for carbon dioxide levels in the atmosphere is used to demonstrate that the cooling due to the diminished greenhouse effect brought our planet close to the limit of global glaciation ≈300 million years ago. These findings highlight the climatic importance of the fossil carbon stored in Earth's coal deposits and thus have implications for climate policy.

Kultur

ALBRIGHT 1942

W. F. Albright, *A Teacher to a Man of Shechem About 1400 B.C.* [Bulletin of the American Schools of Oriental Research](#) **86** (1942), 28–31.

The letter throws a vivid light on the cultural life of central Palestine in the period preceding the Israelite Conquest. It is peculiarly interesting because it was found in the city which preserved Canaanite traditions long after it had become economically absorbed into the Israelite amphictyony.

BOURGEOIS 2017

Quentin Bourgeois & Erik Kroon, *The impact of male burials on the construction of Corded Ware identity, Reconstructing networks of information in the 3rd millennium BC.* [PLoS ONE](#) **12** (2017), e185971. [DOI:10.1371/journal.pone.0185971](#).

The emergence of Corded Ware Groups throughout Europe in the 3rd millennium BC is one of the most defining events in European history. From the Wolga to the Rhine communities start to speak Indo-European languages and bury their dead in an extremely similar fashion. Recent ancient DNA-analyses identify a massive migration from the Eurasian steppe as the prime cause for this event. However, there is a fundamental difference between expressing a Corded Ware identity—the sharing of world views and ideas—and having a specific DNA profile. Therefore, we argue that investigating the exchange of cultural information on burial rites between these communities serves as a crucial complement to the exchange of biological information. By adopting a practice perspective to 1161 Corded Ware burials throughout north-western Europe, combined with similarity indexes and network representations, we demonstrate a high degree of information sharing on the burial ritual between different regions. Moreover, we show that male burials are much more international in character than female burials

and as such can be considered as the vector along which cultural information and Corded Ware identity was transmitted. This finding highlights an underlying complex societal organization of Corded Ware burial rites in which gender roles had a significant impact on the composition and transmission of cultural information. Our findings corroborate recent studies that suggest the Corded Ware was a male focused society.

FAUST 2017

Avraham Faust, *Archaeology, Israelite Cosmology, and the Bible. Biblical Archaeology Review* **43** (2017), vi, 28–29, 68.

We can conclude that the preference for the east and the complete avoidance of the west are characteristic of both the Biblical description of the envisioned temple and the archaeological reality. In the Bible, the east is the main direction, the south and north are present, but the west is not even mentioned. Archaeological evidence demonstrates the same pattern: the east is preferred, north and south are present, and the west is avoided whenever possible.

Both kinds of evidence are in perfect accord—the Biblical description of the envisioned temple together with other texts and even the language on the one side, and the archaeological data on the other.

It appears that Israelite cosmology is responsible for the tendency to orient Israelite Iron Age dwellings to the east.

HOROWITZ 2000

Wayne Horowitz & Nathan Wasserman, *An Old Babylonian Letter from Hazor with Mention of Mari and Ekallātum. Israel Exploration Journal* **50** (2000), 169–174.

The above allows us to propose a general historical framework for our text, the period of the reign of Samsi-Addu, i.e. before the reign of Zimri-Lim, since Mari and Ekallatum were at odds after Zimri-Lim came to power. The large numbers of goods, many of them luxury items, including first-quality garments and objects of gold, silver and bronze, suggest that our letter refers to a special event in the history of the period, rather than regular commerce. In addition, the general tone of the letter gives no indication that the goods being sent are booty or the like.

Methoden

FLANNERY 1982

Kent V. Flannery, *The Golden Marshalltown, A Parable for the Archeology of the 1980s. American Anthropologist* **84** (1982), 265–278.

“Nor in mine,” he said. “But they used to. And they used to talk because however obscure their specialties, they all believe in that ‘integrated whole,’ that ‘body of shared customs, beliefs, and values’ that we called culture.”

“That’s right,” I said. “But now the Paleoindian archeologist would tell you his stone tools were best explained by Optimal Foraging Strategy. And the Maori ethnologist would tell you his creation myths are the expression of a universal logic inside his informants’ heads.”

WOOTTON 2017

David Wootton, *Science and the Reformation. nature* **550** (2017), 454–455.

The scientific and religious revolutions that began 500 years ago were not causally related, but were both stimulated by printing, argues David Wootton.

Zündung

HWANG 2017

Joonsik Hwang, Wooyeong Kim, Choongsik Bae, Wonho Choe, Jeonghwa Cha & Soohyung Woo, *Application of a novel microwave-assisted plasma ignition system in a direct injection gasoline engine*. [Applied Energy](#) **205** (2017), 562–576.

An experimental study was carried out to investigate the effect of microwave-assisted plasma ignition on the combustion and emission characteristics in a 500 cm³ single cylinder direct injection gasoline engine. The microwave-assisted plasma ignition system consisted of a 2.45 GHz magnetron (3 kW), a waveguide, a mixer and a non-resistor spark plug. The first experiments were performed in a 1400 cm³ constant volume combustion chamber (CVCC) to clarify the mechanism of combustion enhancement by microwave ejection. The combustion tests were performed using an acetylene-air mixture at a range of relative air/fuel ratios (λ) under initial ambient pressures of 0.3 MPa and 0.5 MPa. The microwave-assisted plasma ignition has more advanced combustion phase than the conventional spark ignition showing larger initial flame kernel size and faster flame speed. The imaging results of the hydroxyl (OH) radical in ignition and flame demonstrated the potential of a faster chemical reaction by applying microwave on combustion. The microwave-assisted plasma ignition had a higher spark intensity and larger covering area than the conventional spark plug. The distribution and intensity of OH radicals on the surface of the flame were also higher with microwave ejection. In terms of engine test, lean limit was extended up to λ 1.55 and the fuel efficiency was improved by 6% by microwave-assisted plasma ignition. The combustion phase was advanced so the peak of in-cylinder pressure and heat release rate increased more than those of conventional spark ignition. Based on the faster combustion, the combustion stability was enhanced so the lean limit was extended to λ of 1.57. The microwave-assisted plasma ignition system was advantageous in the reduction of carbon monoxide and unburned hydrocarbon emissions, whereas nitrogen oxide emissions increased due to the higher temperatures in the combustion chamber. The engine test results finally demonstrated that the certain level of microwave ejection energy could improve all of engine performance and emission characteristics than conventional spark ignition system.

Highlights:

- Combustion phase was advanced by applying microwave on flame.
- On average, OH intensity with microwave ejection was 3.5 times larger than that of conventional spark.
- Fuel efficiency was improved up to 7.8% with microwave ejection.
- Microwave ejection was advantageous in reduction of CO and HC.

Keywords: Microwave | Non-thermal plasma | Ignition | Flame kernel | Spark ignition engine | Constant volume combustion chamber

JUNG 2017

Dongwon Jung, Kosaku Sasaki & Norimasa Iida, *Effects of increased spark discharge energy and enhanced in-cylinder turbulence level on lean limits and cycle-to-cycle variations of combustion for SI engine operation*. [Applied Energy](#) **205** (2017), 1467–1477.

Improving the thermal efficiency of spark ignition (SI) engines is strongly required due to its widespread use but considerably less efficiency than that of compression ignition (CI) engines. Although lean SI engine operation can offer substantial improvements of the thermal efficiency relative to that of traditional

stoichiometric SI operation, the cycle-to-cycle variations of combustion increase with the level of air dilution, and become unacceptable. For improving the thermal efficiency by extending the lean-stability limit, this study examines the effects of spark discharge energy and in-cylinder turbulence level on lean limits and cycle-to-cycle variations of combustion for SI engine operation. The spark discharge energy was increased by a high-energy inductive ignition system using ten spark coils and the in-cylinder turbulence level was enhanced by a custom adapter installed in the intake port.

The results show that increased spark discharge energy by ten spark coils is effective at shifting the leanstability limit to leaner operation, compared to that of a single spark coil. With shift of the lean-stability limit, significant improvement of thermal efficiency is observed, relative to that of stoichiometric operation. Furthermore, a combination of increased spark discharge energy and enhanced in-cylinder turbulence level makes it possible to allow stable operation at more extended lean-stability limit. This is mainly attributed to shortening the durations of spark timing-to-CA5 and CA10-to-CA90 by both increased spark discharge energy and enhanced in-cylinder turbulence level. However, the cycle-to-cycle variations of SI combustion increase with increasing excess-air ratio even for operation by ten spark coils with the intake port adapter. Finally, the relationship between the spark discharge energy and the SI combustion is examined and compared for ultra-lean operation without and with the intake port adapter. Although indicated thermal efficiency is improved by increased spark discharge energy, the variations of the spark discharge energy do not relate to the variations of the combustion, since total spark discharge energy does not affect both durations of the spark timing-to-CA5 and the CA10-to-CA90, and eventually the heat-release efficiency.

Highlights:

- Thermal efficiency of SI engine increases with the extension of lean-stability limit.
- Increased spark discharge energy is effective at shifting lean-stability limit.
- Lean-stability limit is further extended by enhanced in-cylinder turbulence level.
- Shift of lean limits is mainly attributed to shortened initial combustion duration.

Keywords: SI combustion | Lean operation | Spark discharge energy | Turbulence level | Cycle-to-cycle variations