Liste erstellt am 2013-07-27

Literatur

Aktuell

Campbell 2013
: Kevin L. Campbell & Michael Hofreiter, *Angepasst an die Eiszeit.* Spektrum der Wissenschaft **2013**, viii, 40–45.
Gene von Mammuts enthüllen: Ihr Hämoglobin funktionierte noch bei tiefen Temperaturen gut und versorgte selbst kalte Füße.

Hrudey 2013
: Steve E. Hrudey, *Valuable oil sands environmental research raises several questions.* PNAS **110** (2013), E2748.

Kurek 2013
: Joshua Kurek, Jane L. Kirk, Derek C. G. Muir, Xiaowa Wang, Marlene S. Evans & John P. Smol, *Tracking the extent of oil sands airborne pollution, Reply to Hrudey.* PNAS **110** (2013), E2749.

Pöppe 2013
: Christoph Pöppe, *Goldbach Variationen.* Spektrum der Wissenschaft **2013**, viii, 16–18.
Jede ungerade Zahl ist Summe dreier Primzahlen. Diese Aussage ist jüngst bewiesen worden – ein wesentlicher Schritt zum Beweis der berühmten Goldbachschen Vermutung.

Pöppe 2013
: Christoph Pöppe, *Räumliche Gleichdicke.* Spektrum der Wissenschaft **2013**, viii, 70–73.
Manche Körper lassen sich – theoretisch – in Kugellagern nutzen, ohne Kugeln zu sein. Die Aufgabe, solche räumlichen Gebilde mit möglichst kleinem Volumen zu finden, führt zu einem merkwürdigen Phänomen. Physiker würden es einen entarteten Grundzustand nennen.

Schlichting 2013
: H. Joachim Schlichting, *Immer der Sonne entgegen.* Spektrum der Wissenschaft **2013**, viii, 58–60.
Ein scheinbar harmloses Wandervorhaben entwickelt sich zum komplexen geografisch-astronomischen Problem.

Sills 2013
: Jennifer Sills, *Results: Science Time Travel.* science **340** (2013), 28–30.
If you could go back in time and share one piece of scientific knowledge from today, what time period would you choose, what would you share, and how might that information change the course of history? In April, we asked young scientists to hop in their time machines and report back. We heard from almost 200 readers, with tales of travel ranging from the dawn of man, to ancient Greece and Rome, to

the Industrial Revolution, to the World Wars and recent decades. They imagined the effects of sharing knowledge about climate change, disease prevention, and seminal works in a wide variety of fields. A sample of the best responses can be found below. To allow for as many voices as possible, in some cases we have printed excerpts of longer submissions (indicated by ellipses) and lightly copyedited original text for clarity. To read the complete versions, as well as many more, go to http://scim.ag/NextGen7Results.

Anthropologie

Jones 2009

Martin Jones, *Moving North, Archaeobotanical Evidence for Plant Diet in Middle and Upper Paleolithic Europe.* In: Jean-Jacques Hublin & Michael P. Richards (Hrsg.), *The Evolution of Hominin Diets, Integrating Approaches to the Study of Palaeolithic Subsistence.* Vertebrate Paleobiology and Paleoanthropology (Dordrecht 2009), 171–180.

Boreal woodland is perhaps the most challenging of northerly biomes for hominins and many other mammals. While a certain amount of digestible tissue can be derived from the inner bark and the kernels of some of its trees, the vast bulk of biomass within coniferous woodland offers far less to the human grazer than other woodland types. True, it supports a wealth of fungi, but these are more significant as sources of flavour, toxins, and mind-altering substances rather than calorific bulk. The best place for a human plant gatherer in boreal woodland is in bands of woodland edge vegetation, particularly as they approached the water's edge, where the age old resource of monocot stems may be found, alongside a range of aquatic tubers. When humans encountered the Boreal Zone and extensive stands of coniferous woodland, then the quest for plant food was at its most challenging, and it is conceivable that the expansion of humans into this zone was constrained less by the availability of meat, and more by the combined availability, through the full cycle of seasons, of fats and plant food.

Abstract: This paper reviews the evidence for Middle and Upper Paleolithic plant foods in Europe and neighboring regions. Up until now, most research into the prehistory of plant foods has been conducted on Neolithic and post-Neolithic communities. In recent decades, that has been extended to explore preludes to agriculture and to connect contemporary ethnobotany with the recent archaeological record. The review conducted here shifts focus to the problems of Paleolithic human ecology itself and the challenge of acquiring sufficient plant foods in the novel environments that the first generations of humans crossed and colonized.

Keywords: Archaeobotany | plant foods

Lindeberg 2009

Staffan Lindeberg, *Modern Human Physiology with Respect to Evolutionary Adaptations that Relate to Diet in the Past.* In: Jean-Jacques Hublin & Michael P. Richards (Hrsg.), *The Evolution of Hominin Diets, Integrating Approaches to the Study of Palaeolithic Subsistence.* Vertebrate Paleobiology and Paleoanthropology (Dordrecht 2009), 43–57.

Humans are apparently not well adapted for staple foods that were introduced less than 10,000 years ago, including cereal grains, milk, salt, and refined fat and sugar.

Although such foods can save lives in the short term, they are highly suspected of causing serious age-related Western diseases, single-handedly or in combination. Human physiology seems well designed for a mixture of lean meat, fish, shellfish, insects, and a large variety of plant foods, including carbohydrate-rich fruits and root vegetables. Although some meat/fish/shellfish must be consumed, available evidence suggests that the proportion of meat versus plant foods has varied considerably during hominin evolution.

Abstract: This paper reviews evidence from human physiology as to which foods may have been typically consumed by the hominin ancestral lineage up to the advent of anatomically modern humans. Considerable evidence suggests that many common diseases can be prevented by hunter-gatherer diets. Apparently, human nutritional metabolism is not perfectly fine-tuned for recently introduced staple foods, such as cereals, dairy products, added salt, and refined fats and sugar. It is much more uncertain if human physiology can provide direct evidence of which animal and plant foods were regularly consumed during human evolution, and in what proportions. The requirements of ascorbic acid can easily be met by organ meats from large animals, as well as by plant foods. Vitamin B12 is absent in plant foods and must be supplied from meat, fish, shellfish, or insects, but the required amounts are apparently small.

Since iodized salt and dairy products were not available before the advent of agriculture, only those ancestors with highly regular access to fish or shellfish would be expected to have reached the currently recommended intake of iodine. However, there is insufficient data to suggest that humans, by way of natural selection, would have become completely dependent on marine food sources. Therefore, it is highly possible that human requirements for iodine are currently increased by some dietary factors. These theoretically include goitro-gens in certain roots, vegetables, beans, and seeds. The notion that humans are strictly dependent on marine foods to meet requirements of long-chain omega-3 fatty acids still awaits solid evidence.

Shifting the focus from general human characteristics to ethnic differences, persistent lactase activity in adulthood is obviously not the only characteristic to have emerged under nutritional selection pressure. Other examples are a relative resistance against diseases of affluence in northern Europeans and a relatively low prevalence of gluten intolerance in populations with a long history of wheat consumption.

In conclusion, humans are well adapted for lean meat, fish, insects and highly diverse plant foods without being clearly dependent on any particular proportions of plants versus meat.

Keywords: Human physiology | evolutionary medicine | nutrition

Macdonald 2009

Katharine Macdonald, Wil Roebroeks & Alexander Verpoorte, *An Energetics Perspective on the Neandertal Record.* In: Jean-Jacques Hublin & Michael P. Richards (Hrsg.), *The Evolution of Hominin Diets, Integrating Approaches to the Study of Palaeolithic Subsistence.* Vertebrate Paleobiology and Paleoanthropology (Dordrecht 2009), 211–220.

In addition, an energetics approach enables us to put Neandertals (and AMH) in their wider ecological setting. Species within an ecosystem are linked by transfers of energy. Energetic relations between species on different trophic levels have important implications for the energy available and for species characteristics. Ecological networks were different from the present in Pleistocene environments such as the Mammoth Steppe. As Verpoorte (2006) has suggested, a study of

Middle Pleistocene ecology in energetic terms should provide new insights into Neandertal body size and the ecological constraints on Neandertal energy budgets. The nature of the Middle Paleolithic record has been interpreted in terms of constraints on Neandertal behaviour due to limited cognitive abilities. Our paper shows that Neandertal use of space was optimal given their high energetic requirements, and was not constrained by limited cognitive abilities. However, this does not tell us anything about the cognitive abilities required for Neandertal mobility strategies. Our central-place foraging model is based on the assumption that foragers have perfect knowledge of the distribution and return rates of resources, but makes no assumptions regarding the underlying processes through which such information is acquired or processed.

This example of the use of space indicates that a difference in total energy expenditure can have important implications for behavior. We have focused on the potential of this difference for explaining contrasts between the Middle and Upper Paleolithic record. In our view, the energetics perspective opens up a major arena of integrative research on the Paleolithic. The hominin record documents a number of important changes in energy budgets, such as bipedal locomotion, reduction of sexual dimorphism, and the occupation of middle latitudes, with implications for behavior. In future research we may be able to integrate studies of the evolution of human energetics with wider issues related to the evolution of hominin behavior.

Abstract: Our aim in this paper is twofold: first to provide a broad overview of current knowledge of the Neandertal archaeological record, and second, to provide an example of an energetics perspective on this archeological evidence. Neandertals hunted large mammals in their prime in a wide range of environments, and exploited a limited range of food items compared with some anatomically modern humans. In general, they made use of simple, low investment tools, with little change over time and space, and with an emphasis on the production of cutting tools, and invested little in spatial structure. The archaeological record left by Neandertals seems limited when compared to the Upper Paleolithic of Europe. Explanations for the differences between the archeological record of Neandertals and Upper Paleolithic anatomically modern humans generally highlight supposed cognitive differences. We suggest that it would be worth investigating alternative explanations for these differences, starting from the observation that a number of studies have identified differences in energy use and requirements between the two species. We present an example of an application of an energetics perspective to the Neandertal archeological record, focusing on the use of space. This exercise yields interesting predictions for the archeological record, suggesting that this approach may be useful for explaining differences between the Middle and Upper Paleolithic record in Europe, as well as variation within these periods.

Keywords: Neandertals | energetics | cognition | subsistence | use of space

Snodgrass 2009

J. Josh Snodgrass, William R. Leonard & Marcia L. Robertson, *The Energetics of Encephalization in Early Hominids*. In: Jean-Jacques Hublin & Michael P. Richards (Hrsg.), *The Evolution of Hominin Diets*, *Integrating Approaches to the Study of Palaeolithic Subsistence*. Vertebrate Paleobiology and Paleoanthropology (Dordrecht 2009), 15–29.

Humans represent an extreme example of this relationship, having the largest brains in the sample and the highest relative DQ. The consumption of an energy-dense and nutrient-rich diet partially offsets the large, metabolically expensive brain, as has been suggested in other studies (Leonard and Robertson, 1994; Aiello and Wheeler, 1995). These empirical findings support Milton's (2003) hypothesis

that increased consumption of meat and energy-dense plant foods (e.g., fruit) was necessary for humans to overcome the metabolic constraints on brain expansion. These findings do not imply that dietary change was the impetus for brain expansion among hominids; instead, consumption of a high quality diet was likely a prerequisite for the evolution of a large, energetically expensive brain in hominids. The consumption of nutritionally dense animal foods would have been especially important during early ontogeny, when infants and young children have extremely high metabolic demands from their relatively large energy-expensive brains, yet possess immature digestive morphology and physiology (Kuzawa, 1998; Leonard et al., 2003).

Abstract: Bioenergetics, the study of the use and transfer of energy, can provide important insights into the ecology and evolution of early hominids. Despite a relatively large brain with high metabolic demands, contemporary humans and other primates have resting metabolic rates (RMRs) that are similar to those of other mammals. As a result, a comparatively large proportion of their resting energy budget is spent on brain metabolism among humans (≈20–25 %) and other primates (≈8–10 %) compared to other mammals (≈3–5 %). To understand this shift in energy budget, Aiello and Wheeler's Expensive Tissue Hypothesis (ETH) posits a metabolic trade-off – a reduction in gut size with brain size increase – to explain this phenomenon. Here, we explore the interrelationships between brain size, body size, diet, and body composition using comparative data for humans, non-human primates, and other mammals. Among living primates, the relative proportion of energy allocated to brain metabolism is positively correlated with dietary quality. Contemporary humans fall at the positive end of this relationship, having both a high quality diet and a large brain. Thus, high costs associated with the large human brain are supported, in part, by energy-rich diets. Although contemporary humans display relatively small guts, primates as a group have gut sizes that are similar to non-primate mammals. In contrast, humans and other primates have significantly less skeletal muscle for their size compared to other mammals. These comparative analyses suggest that alterations in diet quality and body composition were necessary conditions for overcoming the constraints on encephalization. Fossil evidence indicates that brain expansion with the emergence of Homo erectus at about 1.8 million years ago was likely associated with important changes in diet, body composition, and body size.

Keywords: Bioenergetics | ecology | hominid evolution | dietary quality | body composition | scaling

Stiner 2009

Mary C. Stiner & Steven L. Kuhn, *Paleolithic Diet and the Division of Labor in Mediterranean Eurasia*. In: Jean-Jacques Hublin & Michael P. Richards (Hrsg.), *The Evolution of Hominin Diets*, *Integrating Approaches to the Study of Palaeolithic Subsistence*. Vertebrate Paleobiology and Paleoanthropology (Dordrecht 2009), 157–169.

The spread of "collaborative economies" would have stemmed from their demographic consequences. As the modern humans entered new environments with novel food supplies and physical challenges, the basic (tropical) system would have continued to change without losing its diverse, collaborative character, because of the competitive advantage of greater efficiency (Winterhalder and Goland, 1993). In patchy and seasonally variable temperate environments, clothing and shelter technology became as or more important than diversifying foraging roles.

Abstract: Hunter-gatherers of the recent era vary in many aspects of culture, yet they display great uniformity in their tendency to divide labor along the lines of gender and age. We argue on the basis of zooarchaeological, technological, and

demographic evidence that the complementary economic roles of men and women so typical of ethnographically documented hunter-gatherers did not appear in Eurasia until the beginning of the Upper Paleolithic. The rich archaeological record of Middle Paleolithic cultures in Eurasia suggests, by contrast, that earlier hominins (Neandertals, among others) pursued narrowly focused economies, with women's activities more closely aligned to those of men with respect to schedules and territory use patterns. Hoofed animals were the principal source of meat for virtually all Middle and Upper Paleolithic foragers, but Upper Paleolithic people supplemented diets to large game with a broader spectrum of small animals, leading to considerable expansion in dietary breadth. Parallel trends are apparent in the technological record. Evidence of skill-intensive, time-consuming craft work that normally supports the food quest among recent forager economies also emerged in the early Upper Paleolithic, including indications of dry hide scraping based on lithic micro-wear evidence and widespread use of bone tools suitable for working hide, plant fibers or both. The comparatively narrow reliance on large game animals during the Middle Paleolithic for meat would have constrained the demographic potential of these endemic populations. More broadly based economies, as indicated both by the faunal record and the increasing complexity of foraging and related technologies, appeared earliest in the eastern Mediterranean region and spread (with modification) to the north and west. The behavioral changes associated with the Upper Paleolithic record signal a wider range of economic and technological roles in forager societies, and these changes in adaptation may have provided the expanding Homo sapiens populations with a demographic advantage over other hominins in Eurasia. Middle Paleolithic human reproductive units probably were not robust at the micropopulation scale, and localized extinctions were likely to have been common. The demographic robustness of the Upper Paleolithic systems may be explained by the rise of new, diversified strategies for evening-out or sharing risk. When and where Middle and Upper Paleolithic populations first came into contact, the marginal advantages provided by collaborative economies meant that replacement of the Middle Paleolithic groups was only a matter of time.

Keywords: Division of labor | hunter-gatherers | Middle Paleolithic | Upper Paleolithic " hunting | zooarchaeology | demography | prey selection | diet breadth | resource intensification

Bibel

Humphreys 2003

Colin J. Humphreys, *The Miracles of Exodus, A scientist's discovery of the extraordinary natural causes of the biblical stories.* (New York 2004).

van der Veen 2010

Peter van der Veen, Christoffer Theis & Manfred Görg, *Israel in Canaan (Long) Before Pharaoh Merenptah? A Fresh Look at Berlin Statue Pedestal Relief 21687.* Journal of Ancient Egyptian Interconnections **2** (2010), iv, 15–25.

In 2001, Manfred Görg published a new reading of a fragmentary name ring on a topographical pedestal relief in the Berlin Museum (no. 21687). Although the inscription had previously been listed in topographical studies, the reading of the fragmentary third name ring had not received adequate attention. Görg suggested reading the broken name as an archaic form for "Israel" and argued that it

could have been copied during the Nineteenth Dynasty from an earlier list. As his publication was in German, his proposal has so far been unavailable to a wider English-speaking readership. Two scholars, Bryant Wood and James Homeier, have briey discussed Görg's proposal; while the former welcomed it, the latter rejected it on linguistic grounds. The present authors republish the relief fragment here in English and include new evidence that appears to support Görg's original reading.

Biologie

Cordain 1999

Loren Cordain, *Cereal Grains: Humanity's Double-Edged Sword*. In: Artemis P. Simopoulos (Hrsg.), *Evolutionary Aspects of Nutrition and Health*, *Diet, Exercise, Genetics and Chronic Disease*. World Review of Nutrition and Dietetics 84 (Basel 1999), 19–73.

Cereal grains lack a number of nutrients which are essential for human health and well-being; additionally they contain numerous vitamins and minerals with low biological availability. Furthermore, the inability of humans to physiologically overcome cereal grain antinutrients (phytates, alkylresorcinols, protease inhibitors, lectins, etc.) is indicative of the evolutionary novelty of this food for our species. This genetic maladaptation between human nutrient requirements and those nutrients found in cereal grains manifests itself as vitamin and mineral deficiencies and other nutritionally related disorders, particularly when cereal grains are consumed in excessive quantity. More disturbing is the ability of cereal grain proteins (protease inhibitors, lectins, opioids and storage peptides) to interact with and alter human physiology. These interactions likely occur because of physiological similarities (resultant from phylogenetic commonalities) shared between humans and many herbivores which have traditionally preyed upon the gramineae family. The secondary compounds (antinutrients) occurring in cereal grains (gramineae family), were shaped by eons of selective pressure and were designed to prevent predation from traditional predators (insects, birds and ungulates) of this family of plants. Because primates and hominids evolved in the tropical forest,wherein dicotyledonous plants prevailed, the human physiology has virtually no evolutionary experience with monocotyledonous cereal grains, and hence very little adaptive response to a food group which now represents the staple food for many of the world's peoples.

Cereal grains obviously can be included in moderate amounts in the diets of most people without any noticeable, deleterious health eVects, and herein lies their strength. When combined with a variety of both animal- and plantbased foods, they provide a cheap and plentiful caloric source, capable of sustaining and promoting human life. The ecologic, energetic eYciency wrought by the widespread cultivation and domestication of cereal grains allowed for the dramatic expansion of worldwide human populations, which in turn, ultimately led to humanity's enormous cultural and technological accomplishments. The downside of cereal grain consumption is their ability to disrupt health and well being in virtually all people when consumed in excessive quantity. This information has only been empirically known since the discovery of vitamins, minerals and certain antinutrients in the early part of this century.

The realization that cereal grain peptides interact with and induce change in human physiology and therefore elicit disease and dysfunction is even newer and dates to the early 1950s with the discovery of wheat gluten as the causative agent in celiac disease. In the past 10 years has come the evidence (admittedly incomplete) that certain cereal peptides may interact with the immune system to elicit

a variety of autoimmune-related diseases. These two seemingly distinct entities (autoimmune disease and consumption of a staple food) are connected primarily through an evolutionary collision of dissimilar genes which bear identical products (molecular mimicry). Although, cereal grain consumption may appear to be historically remote, it is biologically recent; consequently the human immune, digestive and endocrine systems have not yet fully adapted to a food group which provides 56 % of humanity's food energy and 50 % of its protein.
Cereal grains are truly humanity's double-edged sword. For without them, our species would likely have never evolved the complex cultural and technological innovations which allowed our departure from the hunter-gatherer niche. However, because of the dissonance between human evolutionary nutritional requirements and the nutrient content of these domesticated grasses, many of the world's people suVer disease and dysfunction directly attributable to the consumption of these foods.

Cordain 2002

Loren Cordain, S. Boyd Eaton, Jennie Brand Miller, Staffan Lindeberg & Clark Jensen, *An evolutionary analysis of the aetiology and pathogenesis of juvenile-onset myopia*. Acta Ophthalmologica Scandinavica **80** (2002), 125–135.

The available evidence suggests that both genes and environment play a crucial role in the development of juvenile-onset myopia. When the human visual system is examined from an evolutionary perspective, it becomes apparent that humans, living in the original environmental niche for which our species is genetically adapted (as hunter-gatherers), are either slightly hypermetropic or emmetropic and rarely develop myopia. Myopia occurs when novel environmental conditions associated with modern civilization are introduced into the hunter-gatherer lifestyle. The excessive near work of reading is most frequently cited as the main environmental stressor underlying the development of myopia. In this review we point out how a previously unrecognized diet-related malady (chronic hyperinsulinaemia) may play a key role in the pathogenesis of juvenile-onset myopia because of its interaction with hormonal regulation of vitreal chamber growth.

Keywords: myopia – form deprivation – insulin resistance – retinoic acid (RA) – retinoic acid receptors (RAR) – retinoid X receptors (RXR) – hunter gatherers – insulin like growth factor 1 (IGF-1) – insulin like growth factor binding protein 3 (IGFBP-3)

Lindeberg 2007

S. Lindeberg, T. Jönsson, Y. Granfeldt & E. Borgstrand, J. Soffman, K. Sjöström & B. Ahrén, *A Palaeolithic diet improves glucose tolerance more than a Mediterranean-like diet in individuals with ischaemic heart disease*. Diabetologia **50** (2007), 1795–1807.

Aims/hypothesis Most studies of diet in glucose intolerance and type 2 diabetes have focused on intakes of fat, carbohydrate, fibre, fruits and vegetables. Instead, we aimed to compare diets that were available during human evolution with more recently introduced ones.

Methods Twenty-nine patients with ischaemic heart disease plus either glucose intolerance or type 2 diabetes were randomised to receive (1) a Palaeolithic ('Old Stone Age') diet (n=14), based on lean meat, fish, fruits, vegetables, root vegetables, eggs and nuts; or (2) a Consensus (Mediterraneanlike) diet (n=15), based on whole grains, low-fat dairy products, vegetables, fruits, fish, oils and margarines. Primary outcome variables were changes in weight, waist circumference

and plasma glucose AUC (AUC Glucose0–120) and plasma insulin AUC (AUC Insulin0–120) in OGTTs.
Results Over 12 weeks, there was a 26 % decrease of AUC Glucose0–120 (p=0.0001) in the Palaeolithic group and a 7 % decrease (p=0.08) in the Consensus group. The larger (p= 0.001) improvement in the Palaeolithic group was independent (p=0.0008) of change in waist circumference (-5.6 cm in the Palaeolithic group, -2.9 cm in the Consensus group; p=0.03). In the study population as a whole, there was no relationship between change in AUC Glucose0–120 and changes in weight (r=-0.06, p=0.9) or waist circumference (r=0.01, p=1.0). There was a tendency for a larger decrease of AUC Insulin0–120 in the Palaeolithic group, but because of the strong association between change in AUC Insulin0–120 and change in waist circumference (r=0.64, p=0.0003), this did not remain after multivariate analysis.
Conclusions/interpretation A Palaeolithic diet may improve glucose tolerance independently of decreased waist circumference.
Keywords: Diet | Evolution | Glucose intolerance | Ischaemic heart disease | Palaeolithic diet | Type 2 diabetes

Datierung

Hart 2013

John P. Hart, William A. Lovis, Gerald R. Urquhart & Eleanora A. Reber, *Modeling freshwater reservoir offsets on radiocarbon-dated charred cooking residues*. American Antiquity **78** (2013), 536–552.
Obtaining radiocarbon assays on objects of chronological interest is always preferable to obtaining assays on spatially associated charcoal. The development of Accelerator Mass Spectrometer (AMS) dating has expanded the number of objects that can be directly assayed because it requires only a few milligrams of material. Pottery can be directly assayed when charred cooking residues adhering to the interior walls are present. The accuracy of AMS ages derived from residues has been questioned in cases where cooking freshwater aquatic organisms may have introduced carbon from ancient carbon reservoirs into residues. Here we provide analytic protocols for examination of this phenomenon and the results of systematic modeling of age estimates on residues formed from fish and maize with varying percentages of dead carbon. We present a regional case study using a large series of AMS age estimates on residues from the Finger Lakes region of northeastern United States to demonstrate how the paleolimnological record and lipid analysis of residues can help to determine if dates on residues from a given region are likely to have been affected by the presence of ancient carbon. In the case of the Finger Lakes, there is no evidence that ancient carbon affected the age estimates.

Grabung

Vogelsang 2013

Ralf Vogelsang, Jürgen Richter, Zenobia Jacobs, Barbara Eichhorn, Veerle Linseele & Richard G. Roberts, *New Excavations of Middle Stone Age Deposits at Apollo 11 Rockshelter, Namibia, Stratigraphy, Archaeology, Chronology and Past Environments*. Journal of African Archaeology **8** (2013), ii, 185–218.
This paper presents new information obtained from a recent excavation and reassessment of the stratigraphy, chronology, archaeological assemblages and environmental context of the Apollo 11 rockshelter, which contains the longest late

Pleistocene and Holocene archaeological sequence in Namibia. The Middle Stone Age (MSA) industries represented at the site include an early MSA, Still Bay, Howieson's Poort and late MSA. Optically stimulated luminescence (OSL) dating of individual quartz grains yielded numerical ages for the Still Bay and Howieson's Poort, and indicated the presence of a post-Howieson's Poort phase. OSL dating also verified conventional and accelerator mass spectrometry radiocarbon ages for a further two later MSA phases. The timing of the transition from the MSA to the early Later Stone Age was also investigated. Improved resolution of the excavation and a more detailed stratigraphy revealed the presence of near-sterile cultural layers, which in some cases assisted in subdividing the MSA cultural phases. Such information, in combination with the new radiocarbon and OSL chronologies, helps address questions about the duration and continuity of MSA occupation at the site. Analyses of the faunal and archaeobotanical remains show some differences between the occupation phases at the site that may be associated with changing environmental conditions.
Keywords: Apollo 11, Still Bay, Howieson's Poort, MSA, early LSA, OSL dating, archaeofauna, palaeoenvironment

Grundlagen

Tomka 2013

Steve A. Tomka, *The Adoption of the Bow and Arrow, A model based on experimental performance characteristics.* American Antiquity **78** (2013), 553–569.

The timing of the arrival of the bow and arrow in the New World and reasons for its adoption have long been discussed by archaeologists. It typically has been assumed that the bow and arrow provided mechanical and physical advantages over the atlatl and dart, particularly in long-range killing power. This experimental study examines the effectiveness of traditional bows and arrows to deliver lethal wounds to prey species of different sizes. The results suggest that the bow and arrow was effective in hunting prey species such as antelope and deer but ineffective in bringing down larger animals unless changes in hunting strategies were adopted. In contrast, the atlatl and dart would have excelled in large game hunting. It is proposed that the adoption of the bow and arrow and the abandonment of the atlatl and dart were conditioned by their distinct performance advantages and changes in the game species targeted over time.

Isotope

Bocherens 2009

Hervé Bocherens, *Neanderthal Dietary Habits, Review of the Isotopic Evidence.* In: Jean-Jacques Hublin & Michael P. Richards (Hrsg.), *The Evolution of Hominin Diets, Integrating Approaches to the Study of Palaeolithic Subsistence.* Vertebrate Paleobiology and Paleoanthropology (Dordrecht 2009), 241–250.

This example clearly illustrates that the collagen isotopic values of Neanderthal collagen provide data on the relative contribution of different protein resources, but it does not preclude a significant amount of plant food with low nitrogen content, as high as half the dry weight dietary intake.
Abstract: Carbon and nitrogen isotopic ratios of fossil bone collagen reflect those of the average diet, and can be preserved for tens of thousands of years under

favorable conditions. Twelve European Neanderthal bones ranging in age from 100,000 to 32,000 years old have yielded reliable collagen. For this well-preserved collagen, isotopic signatures offer the possibility to reconstruct the dietary habits of Neanderthals. The degree of interpretation of the isotopic results depends on the paleoecological context, especially on the knowledge of the available food resources and their isotopic signatures. Animal bones associated with the studied human remains provide the most reliable source for such information. In addition, isotopic data from animal bones can be retrieved from nearby sites of similar age if they are not present in the hominid site. However, the precision of the interpretation decreases when difference in distance and age between hominids and fauna increases.
This paper illustrates how such isotopic investigations have impacted our understanding of Neanderthals' dietary habits. A critical review of the available data will be presented, with a discussion of some methodological points, such as preservation assessment and quantification of consumed protein resources. Comparisons of prey selection patterns based on isotopic results between Neanderthals and animal predators, such as hyenas, show that Neanderthals obtained much of their dietary proteins from very large herbivores in open environments by hunting. Discrepancies between prey consumption by the isotopic approach and by zooarcheology may point to individuals with special diets or transport decision that lead to the underrepresentation of very large mammal bones in archeological assemblages.
Keywords: Neanderthal | diet | carbon-13 | nitrogen-15 | collagen

Klima

Keenan 2013

Trevor F. Keenan et al., *Increase in forest water-use efficiency as atmospheric carbon dioxide concentrations rise.* nature **499** (2013), 324–327.

n499-0324-Supplement.pdf

Trevor F. Keenan, David Y. Hollinger, Gil Bohrer, Danilo Dragoni, J. William Munger, Hans Peter Schmid & Andrew D. Richardson

Terrestrial plants remove CO2 fromthe atmosphere through photosynthesis, a process that is accompanied by the loss of water vapour from leaves1. The ratio of water loss to carbon gain, or water-use efficiency, is a key characteristic of ecosystem function that is central to the global cycles of water, energy and carbon2. Here we analyse direct, long-term measurements of whole-ecosystem carbon and water exchange3. We find a substantial increase in water-use efficiency in temperate and boreal forests of the Northern Hemisphere over the past two decades.We systematically assess various competing hypotheses to explain this trend, and find that the observed increase is most consistent with a strong CO2 fertilization effect. The results suggest a partial closure of stomata1—small pores on the leaf surface that regulate gas exchange—to maintain a near-constant concentration ofCO2 inside the leaf even under continually increasing atmospheric CO2 levels. The observed increase in forest water-use efficiency is larger than that predicted by existing theory and 13 terrestrial biosphere models. The increase is associated with trends of increasing ecosystem-level photosynthesis and net carbon uptake, and decreasing evapotranspiration. Our findings suggest a shift in the carbon- and water-based economics of terrestrial vegetation, which may require a reassessment of the role of stomatal control in regulating interactions between forests and climate change, and a re-evaluation of coupled vegetation–climate models.

Medlyn 2013

Belinda Medlyn & Martin De Kauwe, *Carbon dioxide and water use in forests*. nature **499** (2013), 287–289.

Plants are expected to respond to rising levels of atmospheric carbon dioxide by using water more efficiently. Direct evidence of this has been obtained from forests, but the size of the effect will prompt debate.

Decades of controlled experiments13–15 have consistently found that the intercellular CO2 concentration (Ci) in photosynthesizing tissue is proportional to the atmospheric CO2 concentration (Ca) — that is, Ci/Ca is constant. The trend identified by Keenan et al., however, implies that intercellular CO2 has remained constant, and so Ci/Ca has strongly decreased with increasing concentrations of atmospheric CO2.

To put it another way, controlled experiments 16,17 have found that the effect of increased atmospheric CO2 levels on water-use efficiency is roughly proportional to the increase in atmospheric CO2. By contrast, according to our calculations, the increase in water-use efficiency found by Keenan and co-workers in the eddy-covariance data is approximately six times larger than the corresponding increase in atmospheric CO2.

Kultur

Haarmann 2011

Harald Haarmann, *Das Rätsel der Donauzivilisation, Die Entdeckung der ältesten Hochkultur Europas*. (München 2011).

In den letzten Jahren haben Archäologen immer mehr Belege dafür gefunden, dass es zwischen dem 6. und dem 3. Jahrtausend v. Chr. auf dem Balkan eine Hochkultur gab, die bereits vor den Mesopotamiern die Schrift kannte. Harald Haarmann führt in seinem Buch erstmals umfassend in diese bisher unbekannte, in vielem noch rätselhafte alteuropäische Kultur ein. Er beschreibt Handelswege und Siedlungen, Kunst und Handwerk, Mythologie und Schrift der Donauzivilisation, geht ihren Ursprüngen am Schwarzen Meer nach und zeigt, welchen Einfluss sie auf die Kultur der griechischen Antike und des Vorderen Orients hatte.

Kirch 2013

Patrick Vinton Kirch, *Gottkönige im Inselparadies*. Spektrum der Wissenschaft **2013**, viii, 62–68.

Auf dem Archipel von Hawaii könnten sich ab dem 14. Jahrhundert echte archaische Staaten entwickelt haben – die letzten in der Weltgeschichte.

Neolithikum

Riehl 2013

Simone Riehl, Mohsen Zeidi & Nicholas J. Conard, *Emergence of Agriculture in the Foothills of the Zagros Mountains of Iran*. science **340** (2013), 65–67.

s340-0065-Supplement.pdf

The role of Iran as a center of origin for domesticated cereals has long been debated. High stratigraphic resolution and rich archaeological remains at the aceramic Neolithic site of Chogha Golan (Ilam Province, present-day Iran) reveal a sequence ranging over 2200 years of cultivation of wild plants and the first appearance of

domesticated-type species. The botanical record from Chogha Golan documents how the inhabitants of the site cultivated wild barley (Hordeum spontaneum) and other wild progenitor species of modern crops, such as wild lentil and pea. Wild wheat species (Triticum spp.) are initially present at less than 10 % of total plant species but increase to more than 20 % during the last 300 years of the sequence. Around 9800 calendar years before the present, domesticated-type emmer appears. The archaeobotanical remains from Chogha Golan represent the earliest record of long-term plant management in Iran.

Willcox 2013

George Willcox, *The Roots of Cultivation in Southwestern Asia*. science **340** (2013), 39–40.

Evidence of early cultivation of crops in the Zagros Mountains of Iran helps to elucidate where and when humans first started to cultivate wild cereals.

Religion

Jack 2013

Anthony I. Jack et al., *fMRI reveals reciprocal inhibition between social and physical cognitive domains*. NeuroImage **66** (2013), 385–401.

Anthony I. Jack, Abigail J. Dawson, Katelyn L. Begany, Regina L. Leckie, Kevin P. Barry, Angela H. Ciccia & Abraham Z. Snyder

Two lines of evidence indicate that there exists a reciprocal inhibitory relationship between opposed brain networks. First, most attention-demanding cognitive tasks activate a stereotypical set of brain areas, known as the task-positive network and simultaneously deactivate a different set of brain regions, commonly referred to as the task negative or defaultmode network. Second, functional connectivity analyses show that these same opposed networks are anti-correlated in the resting state. We hypothesize that these reciprocally inhibitory effects reflect two incompatible cognitive modes, each of which may be directed towards understanding the external world. Thus, engaging one mode activates one set of regions and suppresses activity in the other. We test this hypothesis by identifying two types of problem-solving task which, on the basis of prior work, have been consistently associated with the task positive and task negative regions: tasks requiring social cognition, i.e., reasoning about the mental states of other persons, and tasks requiring physical cognition, i.e., reasoning about the causal/mechanical properties of inanimate objects. Social and mechanical reasoning tasks were presented to neurologically normal participants during fMRI. Each task type was presented using both text and video clips. Regardless of presentation modality, we observed clear evidence of reciprocal suppression: social tasks deactivated regions associated with mechanical reasoning and mechanical tasks deactivated regions associated with social reasoning. These findings are not explained by self-referential processes, task engagement, mental simulation,mental time travel or external vs. internal attention, all factors previously hypothesized to explain default mode network activity. Analyses of resting state data revealed a close match between the regions our tasks identified as reciprocally inhibitory and regions of maximal anti-correlation in the resting state. These results indicate the reciprocal inhibition is not attributable to constraints inherent in the tasks, but is neural in origin. Hence, there is a physiological constraint on our ability to simultaneously engage two distinct cognitive modes. Furtherwork is needed tomore precisely characterize these opposing cognitive domains.

Keywords: Task-positive | Task negative | Default network | Anti-correlated networks | fMRI | Dual-process theory

Story or Book

Frith 2013

Chris Frith, *My brain and I*. nature **499** (2013), 282.

Chris Frith reflects on a book that probes the knotty nexus between brain and mind.

Touching a Nerve: The Self as Brain. Patricia Churchland. W. W. Norton: 2013.

Nevertheless, it may well be true that dualism is deeply ingrained in our nature. A recent brain-imaging study revealed that we have two circumscribed brain circuits: one enables us to think about mental causation, such as how unfairness makes us angry; the other enables us to think about physical causality, such as how heat activates pain receptors. These circuits are mutually antagonistic, so we cannot do both at once (see A. I. Jack et al. NeuroImage 66, 385-401; 2013).

Whitfield 2013

John Whitfield, *The Prince*. nature **499** (2013), 280–281.

John Whitfield finds resonance with today's behavioural sciences in Niccolò Machiavelli's great Renaissance political treatise, begun five centuries ago this month. He writes that "by making an example or two", a ruler "will prove more compassionate than those who, being too compassionate, allow disorders which lead to murder and rapine. These nearly always harm the whole community, whereas executions ordered by a prince only affect individuals." This is similar to current debates over why individuals and societies punish wrongdoers. It is unclear why people are so keen to mete out punishment, which is costly, uses up time and energy, and invites retaliation. And if a punished person reforms, the benefit is spread across the whole community. This creates an incentive to let other people do the punishing.

But believers in strong reciprocity point instead to the wealth of evidence that instincts for fairness, sharing and justice are deeply rooted in human behaviour. In a 2010 lecture series (due to appear as a book) at Yale University titled 'Machiavelli's mistake', one of them — economist Samuel Bowles of the Santa Fe Institute in New Mexico — argues that when governments, assuming people to be self-interested, focus on material incentives as a means of encouraging good behaviour, they risk undermining the prosocial behaviours that underpin society.