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References

Abbo 2010

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

Here we argue that, based on evolutionary, ecological and agronomic considerations, climate change could not have been a suitable background nor a probable cause of plant domestication in the Near East. This thesis is developed based on the year-to-year yield dynamics in traditional rainfed grain farming in semi-arid environments, on the genetic basis that underlies temporal yield dynamics in natural wild cereal populations as well as in traditional farming systems, and upon the recognition that prior to elaborate high capacity and long-range trade networks, yield stability was more important than yield maximization. We also briefly discuss the likely social and cultural responses to subtle and real climatic changes vs. responses to rapid directional environmental trends. Taking into account the agronomic, ecological and genetic aspects discussed, it is suggested that the Near Eastern founder crop assemblage was chosen to function within the normal east Mediterranean precipitation regime, in which good rainy years create the 'normal surplus' that sustains farming communities during drought years, and the different crop types provide the system with its compensating ability. A slow (but real) climatic change is unlikely to induce major (revolutionary) cultural changes. Nor would a prominent environmental change provide the proper background for the origins of agriculture because it would abolish the buffering capacity of the system. Therefore, farming cannot function as a sustainable 'buffering mechanism' to counterbalance climatic instability causing natural resource depletion.

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

Ambos 1996

Claus Ambos, *Prestige und Prestigegüter im beginnenden vorderasiatischen Neolithikum, Nemrik 9 und Qermez Dere.* In: Johannes Müller & Reinhard Bernbeck (Hrsg.), *Prestige – Prestigegüter – Sozialstrukturen, Beispiele aus dem europäischen und vorderasiatischen Neolithikum.* Archäologische Berichte 6 (Bonn 1996), 47–56.

Die Ergebnisse lassen sich folgendermaßen zusammenfassen:

Die soziale Organisation verlief auf Familien bzw. Haushaltsbasis.

Bestimmte gemeinschaftliche Aktivitäten auf höherem sozialen Niveau, die die Gesamtsiedlung betrafen, waren mit zeitweiligem Prestig – verbunden.

Durch kurzfristige Aktivitäten gewonnenes Prestige muß sich jedoch keinesfalls immer in entsprechenden reinen Prestigegütern äußern (wie etwa im Falle des Terrassenbaues).

Charisma läßt sich durch Veränderung der Hausausstattung und der Pfeilspitzenforme n erschließen, wobei hier eventuell auch äußere Faktoren berücksichtigt werden müssen (Raubbau an natürlichen Holzressourcen kann die Einführung von Mergelpfeilem erzwungen haben).

Die Siedlungsaufteilung selbst kann die Ausbildung von Prestige fördern: Da wichtige Tätigkeiten wie die der Lebensmittelverarbeitung der Fundlage nach in

der Öffentlichkeit und nicht abgeschlossen im häuslichen Milieu stattfanden, kamen die hierfür benötigten Fähigkeiten besser zur Geltung.

Die am Anfang dieses Abschnittes von mir verwendete Methode zur Ermittlung von Prestigegütern anhand der Ermittlung besonders auffälliger Artefakte bleibt, gemessen am zweiten Ansatz, der mit archäologischen Korrelaten arbeitet, unbefriedigend.

Anderson 1991

Patricia C. Anderson, *Harvesting of Wild Cereals During the Natufian as seen from Experimental Cultivation and Harvest of Wild Einkorn Wheat and Microwear Analysis of Stone Tools.* In: Ofer Bar-Yosef & François R. Valla (Hrsg.), *The Natufian Culture in the Levant.* Archaeological Series 1 (Ann Arbor 1991), 521–556.

Recent research in various fields has opened new avenues of investigation into the evolution of subsistence strategies concerning exploitation of plants in the Levant (for example, Anderson in press and Hillman and Harris 1989). Our discussion of one aspect of this, wild cereal exploitation, will be based on the microscopic analysis of use-traces on Natufian flint blades and bladelets in light of data from our experiments in cultivating, harvesting, and threshing wild cereals in progress since 1985 at the Institut de Prehistoire Orientale at Tales (France). The sites where the tools studied came from contain wild cereal remains and include, in the Northern Levant, Abu Hureyra (our sample is from Epipaleolithic II and III, 10th-9th millenium bc, Moore, personal communication and this volume) and Mureybet (Final Natufian and, for comparison, the directly ensuing Epi-Natufian, each lasting one or two hundred years of the latter half of the 9th millenium bc, Cauvin 1977, M-C. Cauvin, this vol.) and in the Southern Levant, the Final Natufian of Hayonim Terrace (10th-9th millenium bc, Valla, personal communication and Valla et aL, this volume).

In the course of our large-scale experimental observations of wild cereals, we have been able to replicate traces found on some of the prehistoric tools from these levels in experiments using similar tools hafted to form the cutting edge of sickles and harvesting knives, (see Anderson- Gerfaud 1988, Anderson-Gerfaud et al. in press, Willcox in press). We interpret their use by observing a combination of macroscopic and microscopic traces (corresponding to variables such as: reaping one or many stems at a time; motion and angle of penetration into stems; humidity, hardness and siliceous nature of the stems; proximity of soil abrasives to the tool during harvesting, etc), which our experiments have shown correspond to particular conditions in harvesting wild cereals as opposed to other plants. In view of this data, we discuss the likelihood of various strategies of wild cereal exploitation during the Natufian, with or without cultivation.

Asouti 2012

Eleni Asouti & Dorian Q. Fuller, *From foraging to farming in the southern Levant, The development of Epipalaeolithic and Pre-pottery Neolithic plant management strategies.* Vegetation History and Archaeobotany **21** (2012), 149–162.

This paper reviews the archaeobotanical record of the transition from foraging to farming in the southern Levant. The concise presentation of the published botanical evidence follows a critical assessment of: (a) the nature of Epipalaeolithic plant management strategies, (b) the place of the southern Levant in the polycentric development of Near Eastern plant cultivation and domestication, and (c) region-specific pathways for the emergence of domesticated crop "packages".

Some inferences are drawn and suggestions are made concerning the potential contribution of archaeobotanical research to questions of broader archaeological significance about socio-economic change in the southern Levant during the Pre-pottery Neolithic.

Keywords: Origins of agriculture | Southern Levant | Natufian | Neolithic | Cultivation | Plant domestication

Asouti 2013

Eleni Asouti & Dorian Q. Fuller, *A Contextual Approach to the Emergence of Agriculture in Southwest Asia, Reconstructing Early Neolithic Plant-Food Production*. Current Anthropology **54** (2013), 299–345.

CurrAnth54-299-Supplement1.pdf

The scale and nature of early cultivation are topics that have received relatively limited attention in research on the origins of agriculture. In Southwest Asia, one the earliest centers of origin worldwide, the transition to food production is commonly portrayed as a macroevolutionary process from hunter-gatherer through to cultivator-forager and farming stages. Climate change, resource intensification, sedentism, rising population densities, and increasing social complexity are widely considered by prehistorians as pivotal to the emergence of protoagricultural village life. In this paper we revisit these narratives that have been influenced by culture-history and social evolution, together forming the dominant theoretical paradigms in the prehistory of Southwest Asia. We propose a complementary contextual approach seeking to reconstruct the historical development of Early Holocene plant-food production and its manifold sociocultural environments by intersecting multiple lines of evidence on the biology of plant domestication, resource management strategies, settlement patterns, cultivation and harvesting technologies, food storage, processing and consumption, ritual practices and symbolic behaviors. Furthermore, we propose that early plant-food production in Southwest Asia should be dissociated from ethnographically derived notions of sedentary village life. Plants emerge as important components of community interactions and ritual performances involving suprahousehold groups that were mediated through communal food consumption.

Banning 2011

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

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

Bar-Yosef 1980
O. Bar-Yosef, A. Gopher & A. N. Goring-Morris, *Netiv Hagdud, A "Sultanian" Mound in the Lower Jordan Valley.* Paléorient **6** (1980), i, 201–206.
Test excavations at the tell of Netiv Hagdud, a site of one hectare, revealed several oval structures associated with a Sultanian lithic industry of axes and sickle blades. Samples for C14 dating were obtained.

Bar-Yosef 1991
Ofer Bar-Yosef, Avi Gopher, Eitan Tchernov & Mordechai E. Kislev, *Netiv Hagdud, An Early Neolithic Village Site in the Jordan Valley.* Journal of Field Archaeology **18** (1991), 405–424.
Netiv Hagdud is an Early Neolithic village site in the LowerJordan Valley. Systematic excavations exposed a 500-sq m surface, which included several oval and circular houses. Carbonized plant remains, animal bones, and a wealth of lithic assemblages were the primary materials recovered from the houses and the fill. The seeds indicate that barley cultivation was practiced, along with the continuous gathering of wild fruits and seeds. Gazelle hunting and trapping of migratory waterfowl provided the major meat sources. Evidence concerning distribution of subsistence activities indicates that the site was occupied during at least nine months each year. Domestic activities are expressed in a variety of grinding and pounding tools, a few bone objects, and numerous flint tools. The lithic industry, classified as Sultanian, is characterized by the presence ofKhiam points, sickle blades, and tranchet (Tahunian) axes, and is similar to that uncovered in Jericho. Flexed burials, the removal of adult skulls, and af few male figurines are the only sources of information concering on-site symbolic activities. The report discusses the primary findsfrom the excavations and places the site within the context of other Early Neolithic sites in the southern Levant.

Bar-Yosef 1997a
Ofer Bar-Yosef & Avi Gopher, *The Excavations of Netiv Hagdud, Stratigraphy and Architectural Remains.* In: Ofer Bar-Yosef & Avi Gopher (Hrsg.), *An Early Neolithic Village in the Jordan Valley, Part I: The Archaeology of Netiv Hagdud.* American School of Prehistoric Research Bulletin 43 (Cambridge 1997), 41–69.

Bar-Yosef 1997b
Ofer Bar-Yosef & Avi Gopher, *Discussion.* In: Ofer Bar-Yosef & Avi Gopher (Hrsg.), *An Early Neolithic Village in the Jordan Valley, Part I: The Archaeology of Netiv Hagdud.* American School of Prehistoric Research Bulletin 43 (Cambridge 1997), 247–266.
In this chapter we try to evaluate the environmental and archaeological information gathered during the Netiv Hagdud project which, as mentioned in the introduction, formed part of an ongoing research project in the Lower Jordan Valley. As the excavations both at Netiv Hagdud and Salibiya IX were of limited scope, the excavations at Gilgal I (Noy 1989) provided additional information on a site located less than one km from Netiv Hagdud. The data accumulated thus far allows us to reconstruct the local environment during at least part of the Early Neolithic period (see Chapters 8 and 9 of this part), and to discuss subsistence patterns, suggesting avenues for further research.

We begin this chapter with a paleoclimatic reconstruction, followed by a discussion of the place of Netiv Hagdud and Salibiya IX among other Jordan Valley sites, a comparison of these and other PPNA sites in the southern Levant, and we then conclude with a brief discussion of sites beyond the region in order to provide a wider view of the Early Neolithic of the Levant.

Bartl 2002

Karin Bartl, *Vorratshaltung – Die spätepipaläolithische und frühneolithische Entwicklung im westlichen Vorderasien, Voraussetzungen, typologische Varianz und sozio-ökonomische Implikationen im Zeitraum zwischen 12,000 und 7,600 BP.* SENEPSE 10 (Berlin 2004). Habilitationsschrift, FU Berlin.

Die vorliegende Arbeit behandelt mit dem Thema Vorratshaltung einen alltäglichen, jedoch wesentlichen Siedlungsaspekt, der in archäologischen Fundorten aller Perioden seit dem Beginn der Sesshaftwerdung von besonderer Bedeutung gewesen sein muss. Für die hier untersuchten Zeiträume des späten Epipäolithikums und Frühneolithikums wird er zudem häufig als wesentlicher, wenn nicht ausschlaggebender Faktor für den Beginn sozialer Stratifikation gesehen.

Wie bei allen Untersuchungen über einzelne Aspekte dieses Zeitraums, insbesondere des Frühneolithikums, gilt auch hier, dass durch die intensiven Feldforschungen in den hier behandelten Gebieten der südlichen und nördlichen Levante sowie des anatolischen Raumes einerseits Aussagen auf einer bereits relativ breiten Datenbasis möglich sind, diese jedoch andererseits bedingt durch die Forschungsdynamik weitgehend vorläufigen Charakter haben müssen. Eine solche Einschränkung gilt im weiteren Sinne zwar für viele andere Gebiete vorderasiatischer Archäologie, nur in wenigen Forschungsbereichen finden jedoch derart weitreichende Modifikationen von Entwicklungsmodellen statt wie es beispielsweise gegenwärtig hinsichtlich des kulturellen Verhältnisses von südlicher Levante und dem anatolischen Raum im Frühneolithikum der Fall ist. Darüber hinaus deuten die inzwischen ermittelten, hier allerdings nicht behandelten, frühneolithischen Befunde auf Zypern auf noch deutlich komplexere Entwicklungen als bisher vermutet, insbesondere was Aspekte von Technologie- und Wissenstransfer betrifft. Zugleich erschwert die zunehmende Datenfülle die Definition allgemein verbindlicher Modelle für Großregionen, während Entwicklungen in Kleinregionen für einige Perioden inzwischen deutlicher zu erkennen sind. Generell ist allerdings die sehr differente Datenlage für die einzelnen Subperioden des Gesamtzeitraums zu berücksichtigen. Während für PPNA und EPPNB nach wie vor nur sehr wenige, durch Ausgrabungen erfasste Komplexe vorliegen, sind MPPNB und v.a. LPPNB regional vergleichsweise gut erforscht. Die geringe Anzahl untersuchter Fundorte dieses Zeitraums im anatolischen Raum lässt jedoch auch hier bisher nur partiell gültige Verallgemeinerungen zu. Die in der vorliegenden Arbeit entwickelten Hypothesen zum Themenkomplex Subsistenz und Vorratshaltung sind daher als eine auf dem gegenwärtigen Kenntnisstand basierende Zwischenbilanz zu verstehen, für die spätere Modifikationen denkbar und wahrscheinlich sind.

Die Ermittlung von auf Vorratshaltung deutenden funktionalen Einheiten im archäologischen Befund erfordert zunächst die Definition des möglichen formalen Spektrums. Unter Verwendung ethnologischer und ethnoarchäologischer Studien, die für das hier behandelte Untersuchungsgebiet Vorderasien vorliegen, wurde daher zunächst eine Typologie subrezenter und rezenter Speichereinrichtungen im ländlichen Raum erstellt. In einem zweiten Arbeitsschritt wurde dann versucht, entsprechende typologische Einheiten im archäologischen Kontext der wichtigsten Fundorte aus dem Zeitraum zwischen 12.000 und 6.000 v. Chr. (kalibrierte Daten) zu erfassen und zu interpretieren.

Belfer-Cohen 2002

Anna Belfer-Cohen & Nigel Goring-Morris, *Recent Developments in Near Eastern Neolithic Research*. Paléorient **28** (2002), ii, 143–148.

Though these phenomena are not new within the archaeological record (already appearing by at least the Upper Palaeolithic, if not earlier), it seems that we can observe a particularly striking innovation during the Neolithic (or even late Natufian?), namely the appearance of sites and localities whose primary functions were not devoted to profane activities associated with daily subsistence per se. Such sites were prominent points in the landscape, beacons that attracted attention and served as focal points for one or more Neolithic communities. It is likely that these were tied to each other through sharing common ancestry and marriage (i.e. kinship) ties, exchange networks, the shared access to non-agricultural land (whether "commons" for grazing or for hunting), etc. Yet at the same time these communities also were affirming their land ownership to the exclusion of the others, as the growing permanency and the high investment in field cultivation dictated clear-cut ownership rights and boundaries. It was this unabated and constant source of tension that was at the heart of sharing the responsibilities of erecting and keeping "alive" the sacred sites that belonged to all, and yet to no one in particular.

Bocquentin 2004

Fanny Bocquentin & Ofer Bar-Yosef, *Early Natufian remains: evidence for physical conflict from Mt. Carmel, Israel*. Journal of Human Evolution **47** (2004), 19–23.

Prior to the establishment of farming communities direct physical evidence for human conflict was rarely reported from archaeological contexts. Here we present a case of an Early Natufian (14.500–13.000 cal B.P.) projectile, classified as Helwan lunate, embedded inside the seventh or eighth thoracic vertebra sequence of a mature middle age adult male. Due to calcareous concretion four vertebras were still in anatomical connection when uncovered by F. Turville-Petre, during his excavations at Kebara cave (Mt. Carmel) in 1931.

Keywords: Early Natufian; Kebara Cave; Lunate projectile; Fatal wounding

Bocquentin 2014

Fanny Bocquentin & Ofer Bar-Yosef, *Early Natufian remains: evidence for physical conflict from Mt. Carmel, Israel*. Journal of Human Evolution **47** (2014), 19–23.

Prior to the establishment of farming communities direct physical evidence for human conflict was rarely reported from archaeological contexts. Here we present a case of an Early Natufian (14.500–13.000 cal B.P.) projectile, classified as Helwan lunate, embedded inside the seventh or eighth thoracic vertebra sequence of a mature middle age adult male. Due to calcareous concretion four vertebras were still in anatomical connection when uncovered by F. Turville-Petre, during his excavations at Kebara cave (Mt. Carmel) in 1931.

Keywords: Early Natufian; Kebara Cave; Lunate projectile; Fatal wounding

Burleigh 1982

Richard Burleigh & Keith Matthews, *British Museum natural radiocarbon measurements XIII*. Radiocarbon **24** (1982), 151–170.

The dates were obtained by liquid scintillation counting of benzene using the laboratory procedures outlined in previous lists.

Jericho series Charcoal samples excavated from stratified levels in tell of Jericho (31° 50' N, 35° 30' E). Coll ca 1955 and subm 1976 by Kathleen Kenyon as supplement to previous series (Burleigh, 1981), p. 165–166.

Byrd 1994

Brian F. Byrd, *Public and private, domestic and corporate, The emergence of the Southwest Asian village.* American Antiquity **59** (1994), 639–666.

Despite extensive research on the transition from semimobile hunters and gatherers to sedentary, food-producing villagers in Southwest Asia, associated changes in community organization remain unexplored. Undoubtedly new social and economic mechanisms were necessary to facilitate the success of these larger permanent settlements. The emergence of novel intrasite organizational patterns can be elucidated in the archaeological record through analysis of the built environment. This paper presents an interpretation of temporal transformations in community organization utilizing the results from the detailed analysis of Beidha, one of the most extensively excavated early Neolithic villages in Southwest Asia. It is proposed that the emergence of Neolithic farming villages in Southwest Asia was characterized by two parallel and interrelated organizational trends: a more restricted social network for sharing production and consumption activities, and the development of more formal and institutionalized mechanisms for integrating the community as a whole.

Byrd 2000

Brian F. Byrd, *Households in Transition, Neolithic Social Organization within Southwest Asia.* In: Ian Kuijt (Hrsg.), *Life in Neolithic Farming Communities, Social Organization, Identity, and Differentiation.* Fundamental Issues in Archaeology (New York 2002), 63–98.

These theoretical constructions provide additional insight into understanding how changes in domestic structures and the households that inhabited them correspond to developments on the community level during the Middle PPNB. The transition to food production in the southern Levant appears to be characterized by a corporate pathway that included public construction, group rituals and areas to conduct them, and little evidence of variation in individual or household wealth. If the nuclear families that composed these early villages controlled or owned plots of land that were the focus of plant resource exploitation, then these were inherently unequal in their yield. In addition, the more restricted sharing of resources between households and the greater household control over access and information increased the probability of jealousy and conflict between households. At the same time community and/or lineage level power and authority may have grown. This may have been the impetus for the similarity in size and outward appearance of PPNB domestic structures and uniformity in mortuary practices which reiterated a community-wide egalitarian ethos (Kuijt 1995, 1996).Standardization and elaboration of internal domestic structures in the PPNB aided household autonomy but also reinforced social order within and between households. Elders may have controlled prestige goods, postmarital residence choices, and other items, including marriage costs (Blanton 1995). Thus, the pathway that hunter-gatherers in the southern Levant took in becoming some of the earliest food producers was both novel and conservative. There was a tendency to try and reinforce community social order through the efforts of community leadership while the fundamental social units—households—became more autonomous and more unequal in their ability to perpetuate themselves.

Cauvin 1989
J. Cauvin, *Synthèse générale: La Néolithisation du Levant, huit ans après*. Paléorient **15** (1989), i, 174–179.

Colledge 2004
Sue Colledge, James Conolly & Stephen Shennan, *Archaeobotanical Evidence for the Spread of Farming in the Eastern Mediterranean*. Current Anthropology **45** (2004), S35–S58.
A major topic of debate in Old World prehistory is the relative importance of population movement versus cultural diffusion in explaining the spread of agriculture into and across Europe following its inception in southwestern Asia. An important set of data that has surprisingly been largely absent from this debate is the preserved crops and associated weeds of the earliest farmers. An analysis of archaeobotanical data from 40 aceramic Neolithic sites in southwestern Asia and southeastern Europe shows that there are vegetational signatures that characterize the different geographical regions occupied by the Early Neolithic farmers. On this basis it is argued that the compositional similarities of the crop package between the Levantine core, Cyprus, and Greece are indicative of both the routes of migration of early farming groups and the early agricultural practices of Europe's first farmers.

Curry 2008
Andrew Curry, *Seeking the Roots of Ritual*. science **319** (2008), 278–280.
In the hills of Turkey, researchers are slowly uncovering the world's oldest monumental structures, strange monoliths built by hunter-
gatherers perhaps 11,000 years ago

Dietrich 2012
Oliver Dietrich, Manfred Heun, Jens Notroff, Klaus Schmidt & Martin Zarnkow, *The role of cult and feasting in the emergence of Neolithic communities, New evidence from Göbekli Tepe, south-eastern Turkey*. Antiquity **86** (2012), 674–695.
G|bekli Tepe is one of the most important archaeological discoveries of modern times, pushing back the origins of monumentality beyond the emergence of agriculture. We are pleased to present a summary of work in progress by the excavators of this remarkable site and their latest thoughts about its role and meaning. At the dawn of the Neolithic, hunter-gatherers congregating at G|bekli Tepe created social and ideological cohesion through the carving of decorated pillars, dancing, feasting-and, almost certainly, the drinking of beer made from fermented wild crops.
Keywords: Turkey, Epipalaeolithic, Pre-Pottery Neolithic A and B, monumentality, congregation, dancing, feasting, drinking, beer, alcohol

Edwards 1988
Phillip C. Edwards, *Natufian settlement in Wadi Al-Hammeh*. Paléorient **14** (1988), ii, 309–315.
Wadi Hammeh 27 is an Early Natufian residential settlement, dated ca. 12,000 b.p., located on the eastern margins of the central Jordan Valley. The site has produced a wide variety of cultural and environmental data. This report briefly describes its settlement plan and architecture ; artefacts in basalt, limestone, bone

and chert, incised and carved art pieces, and botanical, faunal and human skeletal remains.

Edwards 2001

Phillip C. Edwards et al., *Archaeology and environment of the Dead Sea Plain: Preliminary results of the first season of investigations by the joint La Trobe University / Arizona State University project*. Annual of the Department of Antiquities of Jordan **45** (2001), 135–157.

Phillip C. Edwards, Steven E. Falconer, Patricia L. Fall, Ilya Berelov, Caroline Davies, John Meadows, Cathryn Meegan, Mary C. Metzger & Ghattas Sayej

Edwards 2002a

Phillip C. Edwards, John Meadows, Ghattas Sayej & Mary C. Metzger, *Zahrat Adh-Dhraʿ 2, A New Pre-Pottery Neolithic A Site on the Dead Sea Plain in Jordan*. Bulletin of the American Schools of Oriental Research **327** (2002), 1–15.

Previously, archaeological exemplars of the Pre-Pottery Neolithic A (PPNA) period that heralded the advent of agrarian societies in the Levant were very rare east of the Jordan River. Those that were known did not include any examples of the larger hamlets, usually buried under alluvial fans, which are known from the Jordan Valley. This situation has changed significantly in the past few years, with the discovery of three PPNA hamlets in the arid southern reaches of the Dead Sea Basin in Jordan. This paper introduces the small mound of Zahrat adh-Dhrac 2 (ZAD 2), the most recently discovered of the trio. ZAD 2, dating to 9,500 radiocarbon years, lies east of the Lisan Peninsula on the southeastern shore of the Dead Sea. The well-dated site contains architectural units comprising stone-built oval huts bonded with mortar. It has a rich lithic assemblage of local flint, but it has also yielded several exotic materials attesting to long-distance exchange, and significant botanical remains including cereals, legumes, and nuts.

Edwards 2002b

Phillip C. Edwards, John Meadows, Mary C, Metzger & Ghattas Sayej, *Results From the First Season at Zahrat adh-Dhra' 2, A New Pre-Pottery Neolithic A Site on the Dead Sea Plain in Jordan*. Neo-Lithics **2002**, i, 11–16.

The archaeobotanical assemblage from ZAD 2 appears as essentially a subset of those recovered at Netiv Hagdud (Kislev 1997), where remains were very well preserved, permitting the identification of seventy-five taxa, mostly to species level. Contrary to Hopfs (1983) interpretation of the PPNA plant remains from Jericho, the Netiv Hagdud remains do not support the contention that domestic varieties of wheat and barley were cultivated in the PPNA. Barley rachis internodes with domestic-type disarticulation scars made up only a small minority of the total, and it was shown experimentally that a similar percentage of 'domestic' types could be obtained by harvesting a crop of wild barley. The wheat grains found at Netiv Hagdud could apparently all be assigned to the wild ancestor of emmer, Triticum dicoccoides.

Edwards 2007

Y. H. Edwards & L. Martin, *Fauna from the Natufian and PPNA Cave Site of Iraq ed-Dubb in Highland Jordan*. Paléorient **33** (2007), i, 143–174.

Occupation of the Iraq ed-Dubb cave site spans the Late Natufian and PPNA periods, providing a rare opportunity to carry out an intra-site exploration of human behaviour across a period when there were significant changes in climate and hunter-gatherers were experimenting with the innovative techniques of plant management which would lead to a new way of life as farmers. This paper focuses on zooarchaeological and taphonomic analyses of faunal remains. The data are examined for evidence of subsistence change between the Late Natufian and PPNA through assessment of species diversity , methods of procurement and issues relating to refuse disposal and degree of sedentism. The results indicate that human occupants of Iraq ed-Dubb were living within the capacity of their environment both in the Late Natufian and PPNA , with little significant change in the range of species hunted and trapped or in strategies for their capture. A small increase in emphasis on gazelle and an intensification of artiodactyl carcass-processing might suggest that the emphasis of the hunting/trapping regime was beginning to change during the PPNA. The apparently well-provisioned economy of this small highland site in the Late Natufian contrasts with the over-stretched subsistence regimes of sites to the west of the river Jordan. Spatial analysis of bone waste distribution has revealed , inter alia, that attitudes towards discarded rubbish appear not to have changed between the Early Natufian and PPNA and imply that discard patterns are related to dwelling-based living , but without the social order conferred by life in a village.

Keywords: Natufian, PPNA, Zooarchaeology, Jordan, refuse disposai

Eshed 2006

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

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

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

Flannery 1972

Kent V. Flannery, *The origins of the village as a settlement type in Mesoamerica and the Near East, A comparative study.* In: Peter J. Ucko, Ruth Tringham & G. W. Dimbleby (Hrsg.), *Man, settlement and urbanism, Proceedings, Research Seminar in Archaeology and Related Subjects, Institute of Archaeology, London University, 1970.* (London 1972), 23–53.

The village—one of the most widespread settlement types in the world today—seems to have been unknown during the first two million years of the human career. The first steps toward truly sedentary life may have been taken by hunter-gatherers in Europe during the Late Pleistocene, but the archaeological evidence is still ambiguous and the trend seems to have broken down at the end of the Würm glaciation. Unmistakeable villages appeared, apparently independently, in several different parts of the world after the close of the Pleistocene epoch. By 7500 B.C. in the Near East, by 2500 B.C. in the Andes, by 1500 B.C. in Mesoamerica, villages were not only widespread but architecturally diversified. In some the houses were of wattle-and-daub, in others of mud or mud-brick, in still others of stone masonry, with or without mortar.

Here is a situation made to order for comparative studies, and its potential did not escape the eyes of the multilinear evolutionists who have contributed so much to anthropological theory over the last two decades. Struck by the apparent contemporaneity of early villages and the Neolithic revolution, the evolutionists came up with a by-now familiar reconstruction: "once agriculture had freed man from the eternal food quest he was able to give up his ceaseless wandering and settle in villages where he perfected pottery making, loom weaving, and all the hallmarks of sedentary life".

Archaeological discoveries over the last ten years have not been kind to this reconstruction. From the Near East came the discovery of fully sedentary communities dating to 8000 B.C., yet lacking all evidence of domestic animals or phenotypically domestic cereals. From Mesoamerica came the discovery of prehistoric groups who cultivated four or five species of plants by 5000 B.C., yet were still nomadic—and remained so for the next 3500 years in spite of substantial increases in the number and variety of cultivars.

Flannery 2002

Kent V. Flannery, *The Origins of the Village Revisited: From Nuclear to Extended Households.* American Antiquity **67** (2002), 417–433.

Stable URL:

http://links.jstor.org/sici?sici=0002-7316In Mesoamerica and the Near East, tlze emergence of the village seems to have involved two stages. In the first stage, individuals were distributed through a series of small circular-to-oval structures, accompanied by communal or ßharedßtorage features. In the second stage, nuclear families occupied substantial rectangular houses with private storage rooms. Over the last

30 years a wealth of data from the Near East, Egypt, the Trans-Caucasus, India, Africa, and the Southwest U.S. have enriched

our understanding of this phenomenon. And in Mesoamerica and the Near East, evidence suggests that nuclear family households eventually gave way to a third stage, one featuring extended family households whose greater labor force made possible

extensive multifaceted economies.

Fuller 2001

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

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

Fuller 2012

Dorian Q. Fuller, Eleni Asouti & Michael D. Purugganan, *Cultivation as slow evolutionary entanglement, Comparative data on rate and sequence of domestication.* Vegetation History and Archaeobotany **21** (2012), 131–145.

Recent studies have suggested that domestication was a slower evolutionary process than was previously thought. We address this issue by quantifying rates of phenotypic change in crops undergoing domestication, including five crops from the Near East (Triticum monococcum, T. dicoccum, Hordeum vulgare, Pisum sativum, Lens culinaris) and six crops from other regions (Oryza sativa, Pennisetum glaucum, Vigna radiata, Cucumis melo, Helianthus annus, Iva annua). We calculate rates using the metrics of darwin units and haldane units, which have been used in evolutionary biology, and apply this to data on nonshattering cereal spikelets and seed size. Rates are calculated by considering data over a 4,000-year period from archaeological sites in the region of origin, although we discuss the likelihood that a shorter period of domestication (1,000–2,000) years may be more appropriate for some crops, such as pulses. We report broadly comparable rates of change across all the crops and traits considered, and find that these are close to the averages and median values reported in various evolutionary biological studies. Nevertheless, there is still variation in rates between domesticates, such as melon seeds increasing at twice the rate of cereals, and between traits, such as nonshattering evolving faster than grain size. Such comparisons underline the utility of a quantitative approach to domestication rates, and the need to develop larger datasets for comparisons between crops and across regions.

Keywords: Domestication syndrome | Unconscious selection | Southwest Asia | Neolithic | Palaeoethnobotany

Gerbault 2014

Pascale Gerbault et al., *Storytelling and story testing in domestication.* PNAS **111** (2014), 6159–6164.

Pascale Gerbault, Robin G. Allaby, Nicole Boivin, Anna Rudzinski, Ilaria M. Grimaldi, J. Chris Pires, Cynthia Climer Vigueira, Keith Dobney, Kristen J. Gremillion, Loukas Barton, Manuel Arroyo-Kalin, Michael D. Purugganan, Rafael

Rubio de Casas, Ruth Bollongino, Joachim Burger, Dorian Q. Fuller, Daniel G. Bradley, David J. Balding, Peter J. Richerson, M. Thomas P. Gilbert, Greger Larson & Mark G. Thomas

The domestication of plants and animals marks one of the most significant transitions in human, and indeed global, history. Traditionally, study of the domestication process was the exclusive domain of archaeologists and agricultural scientists; today it is an increasingly multidisciplinary enterprise that has come to involve the skills of evolutionary biologists and geneticists. Although the application of new information sources and methodologies has dramatically transformed our ability to study and understand domestication, it has also generated increasingly large and complex datasets, the interpretation of which is not straightforward. In particular, challenges of equifinality, evolutionary variance, and emergence of unexpected or counter-intuitive patterns all face researchers attempting to infer past processes directly from patterns in data. We argue that explicit modeling approaches, drawing upon emerging methodologies in statistics and population genetics, provide a powerful means of addressing these limitations. Modeling also offers an approach to analyzing datasets that avoids conclusions steered by implicit biases, and makes possible the formal integration of different data types. Here we outline some of the modeling approaches most relevant to current problems in domestication research, and demonstrate the ways in which simulation modeling is beginning to reshape our understanding of the domestication process.

model | inference | evolution | agriculture | Neolithic

Goodale 2001

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

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

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

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

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

Of the six points with interpretable wear traces, only one showed clear evidence of projectile use (as defined by Fischer et al. 1984; Odell 1988). This was in the form of a bending fracture to the tip and a streak of polish emanating near the tip and running parallel to the orientation of the piece. The remaining tools appear to

have been utilized as perforators of various types: either with a rotary motion as a drill or borer or as a piercer or punch utilizing longitudinal motion. One specimen revealed evidence of at least two functions: the tip had been used as a perforator whilst one edge had been used for cutting.

Gopher 2001

Avi Gopher, Shahal Abbo & Simcha Lev-Yadun, *The "when", the "where" and the "why" of the Neolithic revolution in the Levant*. Documenta Praehistorica **28** (2001), 49–61.

An accumulation of data concerning the domestication of plants and the refinement of research questions in the last decade have enabled us a new look at the Neolithic Revolution and Neolithization processes in the Levant. This paper raises some points concerning the "When" and "Where" of plant domestication and suggests that the origins of plant domestication were in a well-defined region in southeast Turkey and north Syria. It presents a view on the process of Neolithization in the Levant and offers some comments concerning the background and motivations behind the Neolithic Revolution.

Goring-Morris 2011

A. Nigel Goring-Morris & Anna Belfer-Cohen, *Neolithization Processes in the Levant, The Outer Envelope*. Current Anthropology **52** (2011), Supplement, S195–S208.

The Near East is one of those unique places where the transition(s) from hunter-gatherers to farmers occurred locally, so it is possible to observe the whole sequence of these processes within the region as a whole. We discuss the archaeological evidence pertaining to those transformations within the Levant, presenting the particularistic local changes in settlement patterns and the character of the different communities juxtaposed with the landscapes and environmental background. The asynchronous developments clearly reflect the mosaic nature of the Levant in terms of specific local environmental conditions that influenced the scope and pace of Neolithization processes.

Goring-Morris 2014

Adrian Nigel Goring-Morris & Anna Belfer-Cohen, *The Neolithic in the Southern Levant, Yet another 'unique' phenomenon ...*. In: Jean Guilaine, Claire Manen & Thomas Perrin (Hrsg.), *La transition néolithique en Méditerranée, Actes du colloque Transitions en Méditerranée, Muséum de Toulouse, 14–15 avril 2011*. (Paris 2014), 59–75.

Hastorf 1998

Christine A. Hastorf, *The cultural life of early domestic plant use*. Antiquity **72** (1998), 773–782.

To what extent was gender an important factor in plant domestication? How much of the domestication process can be considered as cultural rather than biological? Christine Hastorf considers these and many associated questions in this topical essay about plants and people.

Keywords: agriculture, ciomestication, South America, women, gatherers, hunters, exchange, kinship

Heun 1997

Manfred Heun, Ralf Schäfer-Pregl, Dieter Klawan, Renato Castagna, Monica Accerbi, Basilio Borghi & Francesco Salamini, *Site of Einkorn Wheat Domestication Identified by DNA Fingerprinting*. science **278** (1997), 1312–1314.

The emergence of agriculture in the Near East also involved the domestication of einkorn wheat. Phylogenetic analysis that was based on the allelic frequency at 288 amplified fragment length polymorphism molecular marker loci indicates that a wild group of Triticum monococcum boeoticum lines from the Karacadağ mountains (southeast Turkey) is the likely progenitor of cultivated einkorn varieties. Evidence from archeological excavations of early agricultural settlements nearby supports the conclusion that domestication of einkorn wheat began near the Karacadağ mountains.

Hillman 1990a

Gordon C. Hillman & M. Stuart Davies, *Measured Domestication Rates in Wild Wheats and Barley Under Primitive Cultivation, and Their Archaeological Implications*. Journal of World Prehistory **4** (1990), 157–222.

Man's (or, more probably, Woman's) first cereal crops were sown from seed gathered from wild stands, and it was in the course of cultivation that domestication occurred. Experiments in the measurement of domestication rates indicate that in wild-type crops of einkorn, emmer, and barley under primitive systems of husbandry: (a) domestication will occur only if they are harvested when partially or nearly ripe, using specific harvesting methods; (b) exposure to shifting cultivation may sometimes have been required; and (c) under these conditions, the crops could become completely domesticated within 200 years, and perhaps only 20-30 years, without any conscious selection. This paper (a) considers possible delays in the start of domestication due to early crops of wild-type cereals lacking domestic-types mutants; (b) examines the husbandry practices necessary for these mutants to enjoy any selective advantage; (c) considers the state of ripeness at harvest necessary for the crops to respond to these selective pressures; (d) outlines field measurements of the selective intensities arising from analogous husbandry practices applied experimentally to living wild-type crops; (e) summarizes a mathematical model which incorporates the measured selective intensities and other key variables and which describes the rate of increase in domestic-type mutants in early populations of wild-type cereals under specific combinations of primitive husbandry practices; (f) considers why very early cultivators should have used those husbandry methods which, we suggest, led unconsciously to the domestication of wild wheats and barley; and (g) considers whether these events are likely to leave archaeologically recognizable traces.

Keywords: domestication rate; agricultural origins; einkorn wheat; emmer wheat; selection pressures.

Hillman 1990b

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

Man's first cereal crops were sown from seed gathered from wild stands, and it was in the course of cultivation that domestication occurred. This paper prcsents thr preliminary rrsults of an experimcntal approach to thc measurement of domestication rate in crops of wild-type einkorn wheat exposed to primitive systems of

husbandry. The results indicate that in wild-type crops of einkorn, emmer and barley (a) domestication will have occurred only if they were harvested in a partially ripe (or near-ripe) state using specific harvesting methods; (b) exposure to shifting cultivation may also have been required in somr cases; and (c) given these requirements, the crops could have become completely domcsticatrd within two centuries, and maybr in as littlr as 20-30 years without any form of conscious selection.

This paper (1) considers the possible lrngth of delays in the start of domestication due to early crops of wild-type cereals lacking domestic-type mutants; (2) examines the combination of primitive husbandry practices that would have been necessary for any selective advantage to have been unconsciously conferred on these mutants; (3) considers the state of ripeness (at harvest) necessary for crops to be able to respond to these selective prcssures; (4) outlines field measurements of the selective intensities (selection coefficients) which arise when analogous husbandry practices are applied experimentally to living wild-type crops; (5) summarizes the essential features of a mathrmatical model which inrorporatcs thcsr mcasurrments of selection coefficients and other key variables, and which describes the rate of inrreasc in domestic-type mutants that would have occurred in early populations of wild-type cereals under specific combinations of primitivc husbandry practices; (6) considers why very early cultivators should have used that combination of husbandry methods which, we suggest, unconsciously brought about the domestication of wild wheats and barley; and (7) concludes by considering whether these events arc likely to havc left recognizable tracrs in archaeological remains.

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

Hillman 2001

Gordon Hillman, Robert Hedges, Andrew Moore, Susan Colledge & Paul Pettitt, *New evidence of Lateglacial cereal cultivation at Abu Hureyra on the Euphrates*. The Holocene **11** (2001), 383–393.

So far, Abu Hureyra provides the clearest, continuous record anywhere in the world of an in-situ transition from foraging to farming, although eventually other such sites will doubtless be found. The evidence suggests that, on the Middle Euphrates (and almost certainly elsewhere in southwestern Asia), these transformations were set in train before the end of the Pleistocene, in a climatic context different from that supposed hitherto, and among hunter-gatherers who were already largely sedentary. Here, at least, the primary trigger appears to have been the critically reduced availability of key wild plant staples during the arid conditions of the Younger Dryas climatic episode. This early inception of cultivation then set the scene for the development and rapid spread of integrated agro-pastoral economies in the early Holocene. While the advent of agriculture is often hailed as a triumph in 'laying the foundations of civilization', the social, demographic, nutritional and ecological consequences of the ensuing chain-reaction have mostly proved disastrous, and continue to mould almost every aspect of modern life.

Kenyon 1983

K. M. Kenyon & T. A. Holland (Hrsg.), *Excavations at Jericho, Volume Five: The Pottery Phases of the Tell and Other Finds*. (London 1983).

Appendices B to D
Hopf: Plant Remains
Payne: Flint Industries
Burleigh: Radiocarbon Dates

Kislev 1986

Mordechai E. Kislev, Ofer Bar-Yosef & Avi Gopher, *Early Neolithic domesticated and wild barley from the Netiv Hagdud region in the Jordan valley*. Israel Journal of Botany **35** (1986), 197–201.

Rachis fragments of cultivated (Hordeum distichon L.) along with brittle (H. spontaneum C. Koch) barley from the early eighth or late ninth millennium B.C. were found at Netiv Hagdud, Israel, proving that the domestication of this cereal was already in progress at the beginning of the aceramic Neolithic period. The large quantity of kernels and rachis segments and, especially, the numerous segments with irregular fracture provide clear evidence for domesticated barley.

Kislev 1989

M. E. Kislev, *Pre-domesticated Cereals in the Pre-Pottery Neolithic A Period*. In: Israel Hershkovitz (Hrsg.), *People and Culture in Change*, *Second Symposium on Upper Palaeolithic, Mesolithic and Neolithic Populations of Europe and the Mediterranean Basin*. BAR International Series 508(i) (Oxford 1989), 147–151.

One of the major components of the agricultural revolution in the Neolithic Near East is the cultivation and domestication of two cereals, namely, barley and emmer. It is suggested that the mixtures of wild and domesticated barley, reported in some PPNA sites, may all actually be wild types because 1) the rachis fragments reported are never longer than 1 internode; 2) grain size is not a character symptomatic of the stage of domestication; 3) ancient, charred nodes which exhibit the morphology of domesticated barley have the anatomy of the wild species; 4) in wild, extant barley populations, about 10 % of rachis nodes may show an attached fragment of the upper internode, a fact previously attributed to domesticated plants only. In the case of wild and domesticated emmer wheats, there is still no way to distinguish between them. Therefore, the supposed dating of domestication of cereals to the PPNA period is questioned.

Kislev 1997

Mordechai E. Kislev, *Early Agriculture and Paleoecology of Netiv Hagdud*. In: Ofer Bar-Yosef & Avi Gopher (Hrsg.), *An Early Neolithic Village in the Jordan Valley*, *Part I: The Archaeology of Netiv Hagdud*. American School of Prehistoric Research Bulletin 43 (Cambridge 1997), 209–236.

During the three seasons of excavations at Netiv Hagdud, more than 17,000 charred fruit and seed remnants were recovered. Excavated soil was removed from building floors for flotation and sieved through 0.5 mm mesh. A few plant remains were collected by hand from the soil. Fifty-eight samples were collected from 8 loci for archaeobotanical examination and were fully analyzed. The samples that came to the laboratory were variable in both concentration and quantity but generally were well preserved. Although some retained their hairs, others were found puffed and spongy or broken and unrecognizable. The relatively good preservation states might be explained by assuming that the site was covered by alluvial soil soon after it was abandoned.

The site and its plant remains have been dated by wood charcoal to 9400 ± 180 to 9970 ± 150 uncalibrated years B.P. (Bar-Yosef et al. 1991). Some 75 taxa were recognized, most of them identified to the species level. (See table 8.1 on pp. 231-32.) Sometimes, as was the case with many legume seeds, incomplete preservation, especially the absence of the testa, prevented a full identification. This was the

case with the seeds of many species of the Vicieae group, which are heteromorphic on one side and overlap in shape on the other side. Since the publication of the preliminary results a few years ago, some remains have been reidentified and a few mistakes have been corrected (compare table 8.1 in this chapter to Bar-Yosef et al. 1991: table 5).

Kornienko 2009

Tatiana V. Kornienko, *Notes on the cult buildings of northern Mesopotamia in the Aceramic Neolithic Period*. Journal of Near Eastern Studies **68** (2009), 81–102.

In conclusion, I would like to point out that the definition of types of cult structures in early Neolithic Upper Mesopotamia is quite relative, and it is still difficult to establish certain distinctions between them due to the limited number of data available. Another reason for the impossibility of articulating a profound classification is that at some point there must have been some intermediate forms of cult structures (which gradually evolved in their public significance and decorative design) and interim forms of the rituals that were performed in them.

Despite the limited data, analysis shows to some extent the possibilities that were available to the people (single families or tribes, the entire community, and probably even larger groups of people) who erected the buildings and worshiped the deities living in them.

I share the view that during the Aceramic Neolithic period the land within the borders of the Levant, Upper Mesopotamia, and Iran was a single area in terms of informational links. Moreover, there are signs of probable standardization in PPN Northern Mesopotamian architecture, including the construction of religious buildings and the development in the tradition of symbolic decoration of these types of structures since the earliest period of settlement in Upper Mesopotamia. The evidence indicates that there were even closer links among settlements at the regional level, which may have been the result of cooperation and mutual influence among the dwellers of rural settlements in Aceramic Neolithic Northern Mesopotamia. As a result, a certain cultural unity emerged between separate, local centers, which seem to have played a leading role not only in the manufacturing and exchange of goods but also in the sphere of ideology.

Kozlowski 1990

Stefan K. Kozlowski & Andrzej Kempisty, *Architecture of the pre-pottery neolithic settlement in Nemrik, Iraq*. World Archaeology **21** (1990), 348–362.

The excavations at the site of Nemrik in northern Iraq have revealed a unique series of pre-pottery neolithic settlements dating from the ninth to the first half of the seventh millennium bc. Especially notable is the evidence for house architecture, including interior fittings and the unusual pillar structures which seem to have been supports for the roof. The architecture displays a clear course of development in technique of construction, form, roof support system and the conception of interior fixtures, from the earliest simple hut-like structures to large, relatively richly furnished mud-brick houses with wooden and later, unique to Nemrik, compacted marl roof- supporting pillars. Technological progress is seen as the major factor in the architectural transformations of the eighth and seventh millennia bc.

Kuijt 1998

Ian Kuijt & Hamzeh Mahasneh, *Dhra': An Early Neolithic Village in the Southern Jordan Valley*. Journal of Field Archaeology **25** (1998), 153–161.

Dhra' is an Early Neolithic village site located on the east side of the Dead Sea, and roughly contemporaneous with the Pre-Pottery Neolithic A period occupations at Jericho and Netiv Hagdud. Situated on an alluvial terrace near the springs of Ain Waida', Dhra' was a relatively large pre-agricultural community covering an area of approximately 80 m x 50 m, with a high concentration of oval or circular stone and mud structures. Excavations along the side of a 9 m long bulldozer trench revealed evidence of a later Early Bronze Age occupation overlying two and a half meters of Pre-Pottery Neolithic A period cultural material. Recovered within these Neolithic deposits were the remains of several large semi-subterranean oval structures, radiocarbon dated to approximately 10,000 years ago. Uncovered in another area of the site were the remains of a well-preserved oval stone structure, with a stone bench, radiocarbon dated to approximately 9,600 years ago. The chipped stone industry is characterized by the presence of Khiam points, retouched blades, sickle blades, borers, and large bifacial tools. Groundstone tools include numerous pestles and hand stones. Suprisingly, very few microlithic tools were present with no Hagdud truncations or lunates recovered in excavation.

Kuijt 2000

Ian Kuijt, *Keeping the Peace, Ritual, Skull Caching, and Community Integration in the Levantine Neolithic.* In: Ian Kuijt (Hrsg.), *Life in Neolithic Farming Communities, Social Organization, Identity, and Differentiation.* Fundamental Issues in Archaeology (New York 2002), 137–164.

In light of the growing body of archaeological evidence for social differentiation within MPPNB communities, as well as the symbolic and physical use of material culture to stress real and fictive affinity within and between individuals, households, and communities, I have argued that MPPNB ritual practices reinforced a collective ethos with the continued use of social mechanisms to encourage social cohesion and solidarity. Consideration of the archaeological record in question, with the almost total absence of grave goods with MPPNB primary and secondary interments and the homogenous design of residential architecture, illustrates a pattern that is consistent with communities attempting to emphasize a real or perceived parity between individuals, and the existence of political and economic cooperation and relationships between households. Archaeological studies provide a number of specific material patterns that inform researchers as to how community members may have dealt with new social and organizational pressures associated with increased population aggregation in early agricultural communities.

Collectively, I believe that consideration of these developments, as well as the limited development of social differentiation in the MPPNB, indicates that future research is facilitated by envisioning MPPNB social systems as organized by a series of complex social rules that reaffirmed the egalitarian values and ethos of general society and at the same time permitted the development of social differentiation that crosscut household and kin-group lines.

[A]vailable evidence indicates that the earliest systematic appearance of social differentiation in the Aceramic Neolithic occurred in the MPPNB, between c. 9,200-8,500bp, in the form of cranial deformation, skull plastering and painting, and the select use of secondary cranial removal and caching to differentially identify some community members over others. This realization is important, for if Bar-Yosef and Meadows (1995:88) are correct in arguing that size reduction in goats had already occurred by the MPPNB and that domesticated wheat and barley first appeared in the PPNA communities of Tel Aswad, Jericho, Gilgal, and Netiv Hagdud (Hillman and Davies 1990), then our most convincing evidence for

systematic social differentiation in the Levantine Pre-Pottery Neolithic occurs after the domestication of plants and probably after that of goats as well.

Kuijt 2001

I. Kuijt, *Lithic Inter-Assemblage Variability and Cultural-Historical Sequences: a Consideration of the Pre-Pottery Neolithic A Occupation of Dhra', Jordan*. Paléorient **27** (2001), i, 107–125.

This paper provides a detailed description of the early Pre-Pottery Neolithic A period chipped and ground stone tools recovered from two separate areas of the village of Dhra', Jordan. The chipped stone assemblages from these two areas are characterized by a high proportion of projectile points, awls and borers, wood-working tools, and ground and pecked stone pestles and howls. Two important differences are observed between these contemporaneous chipped stone assemblages : 1) in the proportion of select tool types, specifically projectile points, ground stone objects, and bifacial tools ; and 2) in the type and overall size of projectile points recovered from different areas. The Dhra1 lithic assemblages are compared to other PPNA collections to explore some of the possible reasons for lithic inter-assemblage variation and how this might be linked to change through time. It is argued that high levels of interassemblage variability within the Dhra ' lithic collection in specific, and PPNA assemblages in general, as well as variation in sampling and recovery systems between archaeological excavations, seriously undermine the utility and validity of any subdivision of the southern Levantine PPNA into sub-phases.

Kuijt 2004

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

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

Kuijt 2009a

Ian Kuijt & Bill Finlayson, *Evidence for food storage and predomestication granaries 11,000 years ago in the Jordan Valley*. PNAS **106** (2009), 10966–10970.

Food storage is a vital component in the economic and social package that comprises the Neolithic, contributing to plant domestication, increasingly sedentary lifestyles, and new social organizations. Recent excavations at Dhra' near the Dead Sea in Jordan provide strong evidence for sophisticated, purpose-built granaries in a predomestication context ca. 11,300-11,175 cal B.P., which support recent arguments for the deliberate cultivation of wild cereals at this time. Designed with suspended floors for air circulation and protection from rodents, they are located between residential structures that contain plant-processing instillations. The granaries represent a critical evolutionary shift in the relationship between people

and plant foods, which precedes the emergence of domestication and large-scale sedentary communities by at least 1,000 years.

Kuijt 2009b

Ian Kuijt & Nathan Goodale, *Daily practice and the organization of space at the dawn of agriculture, A case study from the Near East.* American Antiquity **74** (2009), 403–422.

Drawing upon the lithic remains from the Late Natufian and Pre-Pottery Neolithic A occupations of 'Iraq ed-Dubb, Jordan, we utilize a quantifiable statistical approach with Geographic Information Systems analysis to interpret shifting practices that influenced site structure. This study indicates that the highly mobile Late Natufian population who inhabited the site had fairly nondelineated use of space compared to a more delineated use of space during the Pre-Pottery Neolithic A. It appears that intensified intra-community organization of space was a byproduct of decreased residential mobility. Moreover, the emergence of more formal intra-community organization likely aided in the development of much more complex human societies that evolved several millennia after the onset of Holocene conditions.

Lang 2013

Caroline Lang, Joris Peters, Nadja Pöllath, Klaus Schmidt & Gisela Grupe, *Gazelle behaviour and human presence at early Neolithic Göbekli Tepe, south-east Anatolia.* World Archaeology **45** (2013), 410–429.

With its impressive megalithic architecture dating to the tenth to ninth millennium cal. BC, the site of Göbekli Tepe (south-east Anatolia) is singular in the cultural history of mankind. Excavations at this ritual centre produced a rich archaeofaunal assemblage dominated by skeletal remains of Persian gazelle (Gazella subgutturosa). In order to trace relevant features of this species' behaviour in early Neolithic times relating to its dietary demands, catchment area and annual round, zooarchaeological analysis was complemented by stable isotope analysis of carbon, oxygen and strontium in tooth enamel and bone apatite. Demographic profiles and stable isotope results are consistent with a seasonal presence and hence migratory behaviour in gazelle. Conceivably working events, feasting and performing rituals at Göbekli Tepe coincided with high game density in the southern Anti-Taurus piedmont.

Keywords: Göbekli Tepe; Pre-Pottery Neolithic; Persian gazelle; stable isotopes; migratory behaviour.

Lechevallier 1989

M. Lechevallier, D. Philibert, A. Ronen & A. Samzun, *Une occupation khiamienne et sultanienne à Hatoula (Israël)?* Paléorient **15** (1989), i, 1–10.

The site of Hatoula, in western Judea, has been occupied at the recent Natufian. This level is followed by a Khiamian level characterized by an industry with microliths (lunates) and el-Khiam points. In another part of the site, the level following the Natufian can be attributed either to the PPNA (Sultanian) or to a recent Khiamian phase. The features of these occupations are discussed, as well as the meaning implied by the terms "khiamian" and "sultanian".

McBride 2013

A. McBride, *Performance and Participation, Multi-sensual analysis of Near Eastern Pre-Pottery Neolithic non-domestic architecture*. Paléorient **39** (2013), ii, 47–67.

A series of non-domestic structures have been found at Pre-Pottery Neolithic (PPN) sites across the Near East, but have not been comprehensively analysed to determine how they were used and perceived by inhabitants of the site. A multi-sensual embodied analysis of the non-domestic structures at Göbekli Tepe, Nevalý Çori, and Jerf el-Ahmar show that these structures were very open and undifferentiated, and would have facilitated sharing of highly charged experiences rather than fostering and materializing hierarchical relationships. Analysis of the physical reality of inhabiting these spaces permits a contextual and nuanced model of the capacity of the structures to be constructed, elucidating the types of relationships that would be created and maintained within these spaces.

Keywords: Pre-Pottery Neolithic; Non-domestic; Communal; Embodiment; Capacity.

Maher 2011

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

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

Marder 2007

O. Marder, A. N. Goring-Morris, H. Khalaily, I. Milevski, R. Rabinovich & V. Zbenovich, *Tzur Natan, a Pre-Pottery Neolithic A site in Central Israel and observations on regional settlement patterns*. Paléorient **33** (2007), ii, 79–100.

The results of salvage investigations conducted at the Pre-Pottery Neolithic A (PPNA) site of Tzur Natan are described. The site is located on the western fl anks of the Samarian Hills bordering the central coastal plain (Shephelah). The excavations revealed no architectural features but numerous cupmarked bedrock installations. The small fi nds included fl int and groundstone artefacts, as well as a small faunal assemblage. The vast majority of the fl int tools can be attributed to the PPNA, although there may also be a small Middle Epipalaeolithic Geometric Kebaran element present. Notable are the numbers of bifacial tools, some sickle blades, but few projectile points. Local settlement patterns are discussed in light

of several other recent investigations of PPNA sites in the region. In addition to a few larger permanent settlements with architecture, such as Hatoula and Nahal Oren, at the western edges of the Judean, Samarian and Carmel hills, there are numbers of more ephemeral sites, also located on the fl anks of the hill zone. These have little or no architectural remains but quantities of cup-marked installations and groundstone are found in addition to lithic tool assemblages. These smaller sites perhaps focused primarily on (seasonal?) processing of (vegetal?) resources, as well as the production and use of bifacials. Some sickle blades are found but projectile points are rare or absent. Few, if any, PPNA sites are documented actually within the coastal plain. This settlement pattern contrasts markedly with the Early and Middle Epipalaeolithic and the PPNB, but may refl ect some continuity from the Late Natufi an.

Keywords: PPNA, Settlement Patterns, Cupmarks

Mayer 2008

Daniella E. Bar-Yosef Mayer & Naomi Porat, *Green stone beads at the dawn of agriculture*. PNAS **105** (2008), 8548–8551.

The use of beads and other personal ornaments is a trait of modern human behavior. During the Middle and Upper Paleolithic periods, beads were made out of shell, bone, ivory, egg shell, and occasionally of minerals. During the transition to agriculture in the Near East, stone, in particular green stone, was used for the first time to make beads and pendants. We observed that a large variety of minerals of green colors were sought, including apatite, several copper-bearing minerals, amazonite and serpentinite. There seems to be an increase with time of distance from which the green minerals were sought. Because beads in white, red, yellow, brown, and black colors had been used previously, we suggest that the occurrence of green beads is directly related to the onset of agriculture. Green beads and bead blanks were used as amulets to ward off the evil eye and as fertility charms.

transition to agriculture | late Natufian | Neolithic | Near East | symbolism

Mazurowski 2001

Ryszard F. Mazurowski & Thaer Yartah, *Tell Qaramel, Excavations 2001*. Polish Archaeology in the Mediterranean **13** (2001), 295–307.

The Syrian-Polish Archaeological Mission to Tell Qaramel carried out the third season of excavations at the site.1) Fieldwork continued in trenches located in the lowest part of the southern slope of the tell (squares J-7 b,d; K-6 a,c; K-5 b,d). A new trench (L-4 a,c, 5 by 10 m) was opened to the southeast of square K-5. Together with previously excavated trenches J-12, J-11, J-10 and J-9, they form an 80 m long step-trench. The surface of the area explored on the southern slope in 2001 totals 200 sq. m. It was expected after examination of last year's stratigraphical evidence that Pre-Pottery Neolithic layers would be reached forthwith.

Mazurowski 2009

Ryszard F. Mazurowski, Danuta J. Michczyńska, Anna Pazdur & Natalia Piotrowska, *Chronology of the early Pre-Pottery Neolithic settlement Tell Qaramel, Northern Syria, in the light of radiocarbon dating*. Radiocarbon **51** (2009), 771–781.

Archaeological excavations at the Syrian settlement of Tell Qaramel have been conducted since 1999. They are concentrated on remnants of the Protoneolithic and early stages of the Pre-Pottery Neolithic period. The settlement has revealed an extremely rich collection of everyday use of flint, bone, and mostly stone objects, such as decorated chlorite or limestone vessels; shaft straighteners used to

stretch wooden arrow shafts, richly decorated in geometrical, zoomorphic, and anthropomorphic patterns; as well as different kinds of stones, querns, mortars, pestles, grinders, polishing plates, celts, and adzes.

Excavations brought the discovery of 5 circular towers. Some 57 charcoal samples were collected during the excavations and dated in the GADAM Centre in Gliwice, Poland. The stratigraphy of the settlement and results of radiocarbon dating testify that these are the oldest such constructions in the world, older than the famous and unique tower in Jericho. They confirm that the Neolithic culture was formed simultaneously in many regions of the Near East, creating a farming culture and establishing settlements with mud and stone architecture and creating the first stages of a proto-urban being.

Mithen 2000

Steven Mithen, Bill Finlayson, Anne Pirie, Denise Carruthers & Amanda Kennedy, *New Evidence for Economic and Technological Diversity in the Pre-Pottery Neolithic A: Wadi Faynan 16*. Current Anthropology **41** (2000), 655–663.

The evidence summarized above derives from small-scale excavations at WF16 designed to assess the preservation of the site, acquire absolute dates, and evaluate the significance of the site for area excavation. Even from this work the site has added a new economic dimension to the PPNA and provided support to those who argue that the Khiamian and Sultanian are contemporaneous facies of a single settlement system rather than chronologically consecutive phases of the PPNA. In addition to the chipped stone, animal bone, and plant remains, the site has produced assemblages of human bone, coarse stone artefacts, marine shells, stone beads, worked bone, and enigmatic engraved objects. It is evident, therefore, that WF16 has the potential to contribute substantially to our knowledge of the PPNA and the transition to farming in the Near East. On present evidence, it suggests that the PPNA economy encompassed the hunting of Capra, indicating that this behaviour is not associated with the transition to the PPNB. It has also provided evidence that, while the terms "Khiamian" and "Sultanian" may reflect real variation, they show no consistent chronological pattern and may be functional variants within a single technological PPNA package.

Mithen 2003

Steven Mithen, *After the Ice, A Global Human History, 20 000–5 000 BC*. (Cambridge 2006).

Moore 1991

A. M. T. Moore, *Abu Hureyra 1 and the Antecedents of Agriculture on the Middle Euphrates*. In: Ofer Bar-Yosef & François R. Valla (Hrsg.), *The Natufian Culture in the Levant*. Archaeological Series 1 (Ann Arbor 1991), 277–294.

The aim of this article is twofold: to describe briefly the main features of the late Epipalaeolithic or Mesolithic settlement of Abu Hureyra 1 in Syria, and to compare its culture and economy with those of contemporary sites elsewhere in the Levant. This will increase our understanding of the kinds of adaptation that preceded the switch to farming in this region of indigenous agricultural development.

Moore 1992
A. M. T. Moore & G. C. Hillman, *The Pleistocene to Holocene Transition and Human Economy in Southwest Asia: The Impact of the Younger Dryas*. American Antiquity **57** (1992), 482–494.
We present new evidence suggesting that the Late Glacial worldwide episode of cooling known as the Younger Dryas (ca. 11,000-10,000 B.P.) had a significant impact on climate, vegetation, and human economy in southwest Asia. In the Levant a new pollen core extracted from Lake Huleh and plant remains from the early village of Abu Hureyra 1 indicate that forest gave way to steppe in response to the onset of drier climatic conditions contemporary with the Younger Dryas. Similar effects may be seen in pollen cores from elsewhere in southwest Asia. This alteration in climate and vegetation obliged the inhabitants of Abu Hureyra to modify their plant gathering, and led to significant disruptions in culture and settlement over a wide area. We argue that the stresses induced by these events were a contributing factor in the subsequent development of agriculture in southwest Asia.

Moore 2000
Andrew M. T. Moore, Gordon C. Hillman & Anthony J. Legge (Hrsg.), *Village on the Euphrates, From foraging to farming at Abu Hureyra*. (Oxford 2000).

Müller-Neuhof 2014
Bernd Müller-Neuhof, *What did they need arrowheads for? Thoughts About Projectile Points and Hunting Strategies in the SW-Asian PPN*. In: B. Finlayson & C. Makarewicz (Hrsg.), *Settlement, Survey and Stone, Essays on Near Eastern Prehistory in Honour of Gary Rollefson*. (Berlin 2014), 227–233.
Projectile points are one of the most important lithic tool classes for archaeological research on the Pre-Pottery Neolithic in southwest Asia, as the definition of chronologies, reconstruction of technological processes and the interpretation of subsistence strategies rely in part on these items. A common-sense interpretation amongst archaeologists is that projectile points were primarily used as hunting weapons, which at first sight is supported by the regular appearance of faunal remains from wild game in the archaeological record. However, there is almost a complete absence of osteological evidence in the faunal record for the use of projectile points as a hunting aid. This paper discusses this seemingly contradictory information in the archaeological record.

Napierala 2013
Hannes Napierala, Wim van Neer, Andrew W. Kandel, Joris Peters, Hans-Peter Uerpmann & Nicholas J. Conard, *Fish in the Desert? The Younger Dryas and its Influence on the Paleoenvironment at Baaz Rockshelter, Syria*. In: Ofer Bar-Yosef & François R. Valla (Hrsg.), *The Natufian Culture in the Levant*. Archaeological Series 1 (Ann Arbor 2013), 73–82.
The finds from Baaz Rockshelter are a strong indicator that the Late Natufians experienced quite favorable climatic conditions. Bones of the brown trout point to lower mean temperatures and higher precipitation that allowed for perennial streams in the vicinity of the site. The larger mammals also support our view of a closed vegetation cover with stands of higher vegetation that are required by the

cervids. Further evidence comes from the speleothems of the Southern Levant and the site distribution patterns that can be observed. As has been shown, botanical remains from a wider geographic context equally support our hypothesis. This evidence contradicts earlier hypotheses that the climatic cooling of the Younger Dryas led to an aridification that can be paralleled with cultural shifts from the Early to Late Natufian. The cultural and climatic processes at the transition from Pleistocene to Holocene are a key in understanding the shift from hunting and gathering to food production, one of the major innovations in human history. How, when and why these innovations took place still cannot be pinpointed. We hope to have contributed a further piece to the puzzle in showing that cultural changes within the Natufian cannot be explained by mere climatic deterioration and that the YD was not the environmental crisis it was thought to have been.

Peters 1999

J. Peters, D. Helmer, A. von den Driesch & M. Saña Segui, *Early Animal Husbandry in the Northern Levant*. Paléorient **25** (1999), ii, 27–48.

Morphometrical as well as circumstantial evidence indicate that the domestication of sheep and probably also of goat took place in the southern Taurus piedmont during the Early Pre-Pottery Neolithic period (EPPNB). Though caprine husbandry becomes more common in the Northern Levant in the course of the Middle Pre-Pottery Neolithic (MPPNB), it is observed that remains of sheep and goat account for less than 30 of the MPPNB bone samples. Thus the incorporation of sheep and goat into the economy of these early sites is less revolutionary than the term Neolithic revolution might suggest. In the course of the MPPNB two other species acquired domestic status, though apparently in different regions : Bos in the Middle Euphrates Basin and Sus in south-eastern Turkey. By the end of the PPNB, livestock husbandry formed a major component of human subsistence economies throughout the Northern Levant. Except for Ovis, which seem to have been introduced into the Southern Levant from the north, much about the process of diffusion of these farm animals from their centre(s) of domestication to adjacent regions needs to be learned. While the socio-cultural changes during the 11th and 10th millennia cal. leading to more complex, socially stratified societies in the Northern Levant conceivably provided the cultural background against which caprine domestication could take place, we still continue to speculate on why livestock came to be incorporated into the ace ramie Neolithic economy. According to archaeological and palaeobotanical evidence, large scale climatic change and/or landscape deterioration now seem unlikely, reinforcing the idea that socio-cultural factors were primarily responsible for this shift in the pattern of animal exploitation.

Peters 2004

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

The recently discovered Pre-Pottery Neolithic site of Göbekli Tepe (SETurkey) is unparalleled in its architecture and art. The latter is particularly rich in animal depictions — stone figurines, sculptures and megalithic pillars decorated with bas-reliefs — and illustrates the prominent role animals played in the spiritual world of PPN human groups frequenting the site. Up to now, ten vertebrate taxa could be identified, nine of which also appeared in the archaeofaunal record of the site. Discussion focussed upon the possible role of the animal species figured at Göbekli

Tepe, in particular whether the space demarcated by the pillars could have witnessed the performance of hunting rituals, initiation and passage rites, spiritual encounters or funeral practices. In view of our limited knowledge about the role animals played in the symbolic world of the PPN, in particular with respect to the logic and metaphysics governing the choice of species, the question of what purpose the enclosures served will take much more time to be properly answered.

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

Rosenberg 1998

M. Rosenberg, R. Nesbitt, R. W. Redding & B. L. Peasnall, *Hallan Çemi, pig husbandry, and post-pleistocene adaptations along the Taurus-Zagros arc (Turkey)*. Paléorient **24** (1998), i, 25–41.

Recent work at Hallan Çemi and other round house horizon sites in eastern Anatolia indicates that the Taurus-Zagros flanks were a second autochthonous center of neolithization in southwestern Asia. Fully settled complex hunter- gatherer societies are in existence in this area by the late Younger Dryas. These settled village societies were based on adaptations that did not involve cereal exploitation, presumably because cereals were absent in this area during the late Younger Dryas. Instead , these adaptations revolved around the exploitation of nuts and pulses, plus the hunting of ovicaprids and deer supplemented by early experiments with animal husbandry involving pigs. They are thus distinct from those that served as the foundation for the earliest sedentary societies in the Levant. Most current attempts to explain the beginnings of settled village life in southwestern Asia are based solely on Levantine data, which until recently were virtually all that were available. The Anatolian data do not conform to the Levantine pattern and thus raise serious questions about the general validity of these models.

Rosenberg 2000

Michael Rosenberg & Richard W. Redding, *Hallan Çemi and Early Village Organization in Eastern Anatolia*. In: Ian Kuijt (Hrsg.), *Life in Neolithic Farming Communities, Social Organization, Identity, and Differentiation*. Fundamental Issues in Archaeology (New York 2002), 39–61.

Hallan Semi represents the remains of a fully sedentary group of huntergatherers on the threshold of food production. It also exhibits the basic socioeconomic and sociopolitical characteristics of a fully settled village society. This indicates that the basic structure of Neolithic society coalesced with the very beginnings of sedentary lifeways and did not develop in tandem with either the gradually increased reliance on food production or with the gradual elaboration of culture during the Neolithic.

Specifically, Hallan Semi exhibits a community layout that provides for some degree of individual privacy. This indirectly implies a significant departure from the generalized reciprocal sharing that characterizes mobile hunter-gatherer societies. Also, the formal tallies represented by the notched batons, whether they stand for things done or things given, indicate the formal recognition of individual social action and thus constitute another significant departure from the mobile hunting-gathering norm. In addition, Hallan Çemi appears to contain public buildings representing the existence of sociopolitical groupings at the suprahousehold level. These represent still another departure from the mobile hunter-gatherer norm and would have functioned to, among other things, resolve conflicts and otherwise promote group cohesion in the context of a fully sedentary lifeway. Lastly,

while the precise size of the Hallan Semi community is debatable, as was its precise sociopolitical organization, there is little doubt that it was a relatively small community, probably not much larger than what is thought to be typical of mobile hunting-gathering bands. This means that the abovedescribed aspects of community organization were not a product of community size, suggesting that they were instead a direct product of sedentism.

Finally, there is evidence for public feasting. This evidence takes the form of the central activity area deposits themselves, with their bone and firecracked stone concentrations. It also takes the form of the formalized food preparation and consumption implicit in the stone bowls and sculpted pestles. Whether this feasting was for purposes of sociopolitical competition, building socioeconomic and sociopolitical ties with other neighboring communities, or some combination of the two is not clear. However, the latent hostility suggested to characterize the earliest stages of the shift to settled village life (cf. Rosenberg 1994, n.d), coupled with Hallan Çemi's apparent small size, the evidence for trade, etc., favor a cooperation fostering rather than competitive role for such feasting.

Rosenberg 2010

D. Rosenberg, R. Yeshurun, I. Groman-Yaroslavski, H. Winter, A. Zertal, R. Brown-Goodman & D. Nadel, *Huzuq Musa – A Preliminary Report on the Test Excavation at a Final Epipalaeolithic/PPNA Site in the Jordan Valley*. Paléorient **36** (2010), ii, 189–204.

The transition from mobile hunter-gatherers to sedentary farmers in the Near East was one of the most crucial steps in human evolution. Several sites belonging to either the Late Epipalaeolithic or the Early Neolithic periods were studied in the Jordan Valley, one of the primary research regions for this important shift. However, occupation sites dating to the transitional phase between these periods are rare. Here we present our reconnaissance investigations at one such site, Huzuq Musa (Jordan Valley). The finds bear both Late/Terminal Epipalaeolithic (Natufian culture) and Pre-Pottery Neolithic A (PPNA) characteristics, attesting to an occupation, which most probably dates to a final stage of the Epipalaeolithic period and/or to the earliest local PPNA period. Highly similar lithic components were previously recognized only at one other site—Nahal Ein Gev II. As such, Huzuq Musa may be one of the better-preserved sites that bridge the gap between the Late/Final Natufian and the PPNA in the Jordan Valley.

Keywords: Final Epipalaeolithic; Jordan Valley; Natufian; PPNA.

Sage 1995

Rowan F. Sage, *Was low atmospheric CO2 during the Pleistocene a limiting factor for the origin of agriculture?* Global Change Biology **1** (1995), 93–106.

Agriculture originated independently in many distinct regions at approximately the same time in human history. This synchrony in agricultural origins indicates that a global factor may have controlled the timing of the transition from foraging to foodproducing economies. The global factor may have been a rise in atmospheric CO2 from below 200 to near 270 µmol mol-1 which occurred between 15,000 and 12,000 years ago. Atmospheric CO2 directly affects photosynthesis and plant productivity, with the largest proportional responses occurring below the current level of 350 µmol mol-1 In the late Pleistocene, CO2 levels near 200 µmol mol-1 may have been too low to support the level of productivity required for successful establishment of agriculture. Recent studies demonstrate that atmospheric CO2 increase from 200 to 270 µmol mol-1 stimulates photosynthesis and biomass

productivity of C3 plants by 25 % to 50 %, and greatly increases the performance of C3 plants relative to weedy C4 competitors. Rising CO2 also stimulates biological nitrogen fixation and enhances the capacity of plants to obtain limiting resources such as water and mineral nutrients. These results indicate that increases in productivity following the late Pleistocene rise in CO2 may have been substantial enough to have affected human subsistence patterns in ways that promoted the development of agriculture. Increasing CO2 may have simply removed a productivity barrier to successful domestication and cultivation of plants. Through effects on ecosystem productivity, rising CO2 may also have been a catalyst for agricultural origins by promoting population growth, sedentism, and novel social relationships that in turn led to domestication and cultivation of preferred plant resources.

Keywords: origin of agriculture, CO2 enrichment, crop domestication, global change, neolithic transition, photosynthesis

Schmidt 2000

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

The PPN mound of Göbekli Tepe is situated on top of a mountain north of the Harran plain , near the town of §anliurfa in Southeastern Turkey. No comparable site is known so far in the Near East in terms of the topographical setting , its megalithic architecture, large scale stone sculptures and several other unusual items. The importance of the religious function of this site can hardly be denied. To the common model of Early Village Farming Communities of the Near East , molded by ecological and economical factors , Göbekli Tepe offers a quite different point of view.

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

Stordeur 1996

D. Stordeur, B. Jammous, D. Helmer & G. Willcox, *Jerf el-Ahmar, A New Mureybetian Site (PPNA) on the Middle Euphrates*. Neo-Lithics **1996**, ii, 1–2.

The two campaigns at Jerf al-Ahmar have reinforced our knowledge of the Mureybetian and its cultural and regional cohesion. The area excavation is providing a plan of the juxtaposition and evolution of several houses. Deep soundings are providing a rich sample for environmental work. New finds such as the engraved stone objects offer new insights into cultural developments for the period. It is hoped that the 1997 (final) campaign will provide an equally rich array of data for this important but still little-known period.

Tanno 2012

Ken-ichi Tanno & George Willcox, *Distinguishing wild and domestic wheat and barley spikelets from early Holocene sites in the Near East*. Vegetation History and Archaeobotany **21** (2012), 107–115.

Identifying morphologically domestic cereals is essential to understanding the origins of agriculture. Charred spikelet bases provide the best evidence for distinguishing wild from domestic varieties of emmer, einkorn and barley; however until now, identification criteria have not been agreed upon or well established. We examined more than 20,000 remains of charred spikelets from eleven early Holocene sites in the Near East, classing them into nine groups. We show that damage and fragmentation of wheat spikelets probably due to dehusking makes identification problematic, and only when the abscission scar is well preserved is it

possible to distinguish wild spikelets which shatter from domestic spikelets which adhere and separate during threshing. Barley spikelets were found to be less damaged and more easily identified, perhaps because the processing was less damaging. Einkorn was dominant over emmer on early sites, whereas on later sites emmer was dominant. Identifications presented here from eleven sites date from approximately 13000 to 8200 cal B.P. They give an incomplete picture, but no domestic cereals were identified during the PPNA (Pre-pottery Neolithic A). Early PPNB Aswad produced domestic barley but at other sites for this period the evidence is inconclusive. Unequivocal signs of domestic emmer spikelets appear during the Middle PPNB about 10,000 years ago but wild forms continue as part of the crop after this period. These conclusions are based on limited data. Future studies will undoubtedly produce a more accurate picture.

Keywords: Wheat | Barley | Origins | Near East | Domestication | Agriculture

Tchernov 1997

E. Tchernov, *Are Late Pleistocene Environmental Factors, Faunal Changes and Cultural Transformations Causally Connected? The case of the Southern Levant*. Paléorient **23** (1997), ii, 209–228.

At the eve of the Epipaleolithic an irreversible transformation took place in the southern Levant from small nomadic bands of an ephemeral nature and high residential mobility into a sedentary social organization, while acquiring new properties such as labor division, intergroup identification and wide usage of storage facilities. The abrupt replacement of many small Geometric Kebaran seasonal sites with a few relatively large long-term Natufian habitations emerged without traces of intermediate stages. This phenomenon is perhaps the most astonishing example of an increase in the level of complexity of social organization manifested throughout human history. It is argued that the main socio-economic transformations in human evolution were basically detached from the impact of the environment, at least since the Upper Paleolithic, and may be explained by the same basic innate self-organization properties that extend from DNA molecules to biosocialization. No causal and temporal matching between the local cultural changes and the global climatic events can be inferred, in particular during the abrupt shift to sedentisn in the early Natufian, and the transformation to incipient domestication during the PPNB. The cohesiveness of the southern Levantine paleo-communities lasted uninterruptedly from early Natufian to late PPNB, during which the Southwest Asian arid belt supported a rich diversity of Palearctic species, relicts of which still occupy the mountainous region of this areas. It is argued that the southern Levantine climatic oscillations cannot be directly correlated with the ecological and physiological behavior of organisms; certainly not with that of late humans.

Keywords: Southern Levant, Epipaleolithic, Kebaran, Natufian, Neolithic, Sedentism, Domestication, Self-organization, Increase in biological complexity

Unger-Hamilton 1991

Romana Unger-Hamilton, *Natufian Plant Husbandry in the Southern Levant and Comparison with that of the Neolithic Periods, The Lithic Perspective*. In: Ofer Bar-Yosef & François R. Valla (Hrsg.), *The Natufian Culture in the Levant*. Archaeological Series 1 (Ann Arbor 1991), 483–520.

Which plants were harvested with the lustered "sickle" blades from the Natufian levels (ca. 10,800 to 8000 BC [see Weinstein 1984]) has been the subject of long debate. Some scholars thought that the blades had been used to harvest cultivated cereals (e.g. Neuville 1934; Garrod and Bate 1937), others thought that they

indicated a trend towards the exploitation of cereals (Harlan unpublished manuscript; Henry 1981), while others thought that they had been used for the harvest of other plants, such as grasses or reeds (Vita-Finzi and Higgs 1970). The dearth of archaeobotanical evidence for this period in the southern Levant is well known (e.g. Buxo i Capdevila in press), so it is appropriate to deal with this problem through lithic analysis (Unger-Hamilton 1988 and 1989).

Verhoeven 2004

Marc Verhoeven, *Beyond Boundaries, Nature, Culture and a Holistic Approach to Domestication in the Levant.* Journal of World Prehistory **18** (2004), iii, 179–282.

The main objective of this paper is to suggest an alternative approach for the investigation of domestication in the Levant. First, basic data regarding domestication in the Levant are presented. Then the various traditional approaches towards domestication in the prehistoric Levant, labeled (1) environmental, (2) social and anthropological, and (3) cognitive, are briefly reviewed. This discussion forms the basis for a proposal of a "holistic approach," in which domestication is regarded as a long-term, multidimensional and multirelational phenomenon, including many elements—such as plants, animals, humans, material culture and ancestors—with increasing human manipulation of these various constituents. After a presentation of the theoretical framework, a growth metaphor is used to reconstruct the process of domestication (ca. 20,000–6500 b.p.) as a number of phases: (1) germination in the Kebaran; (2) development in the Early Natufian; (3) retreat/dormancy in the Late/Final Natufian; (4) growth in the Pre-Pottery Neolithic A; (5) florescence in the Early- and Middle Pre-Pottery Neolithic B: (6) further development in the Late Pre-Pottery Neolithic B; (7) dispersal in the Final Pre-Pottery Neolithic B and the Pottery Neolithic. In each of these phases, relations between the various elements are dealt with, special attention being paid to symbolical relations, as evidenced by "art" and ritual.

Keywords: domestication; Levant; Epipaleolithic; Neolithic; nature and culture; holism; ritual; symbolism.

Watkins 1992

T. Watkins, *The Beginning of the Neolithic: searching for meaning in material culture change.* Paléorient **18** (1992), i, 63–75.

The elaborate concern for houses at the proto-neolithic site of Qermez Dere in N Iraq and the relatively rapid changes in material culture suggest that an important change was in progress in the community's way of life, and in particular in its attitude to the concept of 'home' as signified by the symbolic activities focused on the houses. These cultural changes seem to be associated with social stress which reached to the point of inter-communal conflict and warfare. The main purpose of the essay is to attempt to relate these culturally indicated changes occurring at the very beginning of the neolithic period to the economic evidence and to recent anthropological work on sedentary or complex hunter-gatherer societies and their handling of 'resource-stress'.

Watkins 2010

Trevor Watkins, *New light on Neolithic revolution in south-west Asia.* Antiquity **84** (2010), 621–634.

Shortly after his retirement from a distinguished career in the Department of Archaeology at Edinburgh, the author gave the Rhind Lectures for 2009, bringing together his thoughts about the Neolithic revolution, and comparing Childe's ideas

with today's. These lectures, summarised here, announced the modern vision to a wide audience. It is a reversal of the old: Epipalaeolithic people came together in the first large, permanent communities, to form extensive settlements which only later needed to be fed by farming.

Keywords: south-west Asia, Neolithic revolution, Gordon Childe, spirituality, monumentality, agriculture

Webb 2002

Steven G. Webb & Phillip C. Edwards, *The Natufian human skeletal remains from Wadi Hammeh 27 (Jordan)*. Paléorient **28** (2002), i, 103–123.

This report describes skeletal remains from the early Natufian site ofWadi Hammeh 27 in Jordan. At least seven individuals are represented, and although small, the collection is notable for the eclecticism of its mortuary practice. Modes of mortuary disposal and ritual include a single-primary burial, a collective-secondary burial, burnt human cranial fragments disposed in residential contexts, and the ochre staining of bones. The two burials come from the lowest phase of the site, with fragmentary burials and smaller amounts of material issuing from the upper phases. The primary inhumation is marked by a neighbouring pit, which seems to be augmented by other features through three subsequent stratigraphie phases. Artefact types accompanying the burials were limited to a single Dentalium shell necklace. Overall, the bone series represent gracile individuals with good nutritional and health status. The most extensive data was gained from Homo 1, whose skeleton revealed indications of high functional demands, including several healed injuries, arthritis, a preference for using the right arm, and severe wear of the first molars.

Keywords: Natufian, Jordan, Wadi Hammeh, Human-skeletons, Funeral practices.

Weiss 2004

Ehud Weiss, Wilma Wetterstrom, Dani Nadel, and Ofer Bar-Yosef, *The broad spectrum revisited, Evidence from plant remains*. PNAS **101** (2004), 9551–9555.

The beginning of agriculture is one of the most important developments in human history, with enormous consequences that paved the way for settled life and complex society. Much of the research on the origins of agriculture over the last 40 years has been guided by Flannery's [Flannery, K. V. (1969) in The Domestication and Exploitation of Plants and Animals, eds. Ucko, P. J. & Dimbleby, G. W. (Duckworth, London), pp. 73–100] "broad spectrum revolution" (BSR) hypothesis, which posits that the transition to farming in southwest Asia entailed a period during which foragers broadened their resource base to encompass a wide array of foods that were previously ignored in an attempt to overcome food shortages. Although these resources undoubtedly included plants, nearly all BSR hypothesis-inspired research has focused on animals because of a dearth of Upper Paleolithic archaeobotanical assemblages. Now, however, a collection of >90,000 plant remains, recently recovered from the Stone Age site Ohalo II (23,000 B.P.), Israel, offers insights into the plant foods of the late Upper Paleolithic. The staple foods of this assemblage were wild grasses, pushing back the dietary shift to grains some 10,000 years earlier than previously recognized. Besides the cereals (wild wheat and barley), small-grained grasses made up a large component of the assemblage, indicating that the BSR in the Levant was even broader than originally conceived, encompassing what would have been low-ranked plant foods. Over the next 15,000

years small-grained grasses were gradually replaced by the cereals and ultimately disappeared from the Levantine diet.

Weiss 2006

Ehud Weiss, Mordechai E. Kislev, Anat Hartmann, *Autonomous Cultivation Before Domestication*. science **312** (2006), 1608–1610.

Early Near Eastern crop cultivation was a trial-and-error process. Some crops continued until full domestication, while others were abandoned and later adopted independently by distant societies.

Willcox 2002

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

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

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

Willcox 2004

George Willcox, *Measuring grain size and identifying Near Eastern cereal domestication, Evidence from the Euphrates valley*. Journal of Archaeological Science **31** (2004), 145–150.

Cereal grains recovered from recent excavations at two early Neolithic tenth millennium (BP non cal.) sites on the Euphrates were measured. The results presented as scatter diagrams showed that there was an increase in grain size between early and later levels. This led to the question of whether or not the changes were due to the effects of domestication. The data provided an opportunity to evaluate the use of measurements as a method to identify morphological domestication from early farming sites. Results were compared to domesticated specimens from a site dating to the end of the seventh millennium situated in the same geographical area and it was found that the upper size range from the Neolithic levels corresponded well with domesticated grains. Data from some published sites was also plotted. The factors affecting grain size such as morphological domestication, charring, environmental factors and crop processing are discussed in relation to the results.

Keywords: Domestication; Grain size; Near East; Cereals; Neolithic; Chalcolithic

Willcox 2009

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

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

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

Willcox 2012

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

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

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

Wright 1994

Katherine I. Wright, *Ground-stone tools and hunter-gatherer subsistence in Southwest Asia, Implications for the transition to farming*. American Antiquity **59** (1994), 238–263.

Ground-stone tools and hunter-gatherer subsistence in late Pleistocene southwest Asia are examined in light of ethnographic and experimental data on processing methods essential for consumption of various plant foods. In general, grinding and pounding appear to he labor-intensive processing methods. In particular, the labor required to make wild cereals edible has been widely underestimated, and wild cereals were unlikely to have been "attractive" to foragers except under stress conditions. Levantine ground-stone tools were probably used for processing diverse plants. The earliest occurrence of deep mortars coincides with the glacial maximum, camp reoccupations, the onset of increasingly territorial foraging, and the earliest presently known significant samples of wild cereals. Two major episodes of intensification in plant-food processing can be identified in the Levant, coinciding

respectively with the earliest evidence for sedentism (12,800-11,500 B.P.) and the transition to farming (11,500-9600 B.P.). The latter episode was characterized by rising frequencies of grinding tools relative to pounding tools, and suggests attempts to maximize nutritional returns of plants harvested from the limited territories characteristic of sedentary foraging and early farming. This episode was probably encouraged by the Younger Drvas, when density and storabilitl of foods may have outweighed considerations of processing costs.

van Zeist 1982

W. van Zeist & J. A. H. Bakker-Heeres, *Archaeobotanical Studies in the Levant 1, Neolithic Sites in the Damascus Basin: Aswad, Ghoraifé, Ramad*. Palaeohistoria **24** (1982), 165–256.

In the present study the results of the palaeobotanical examination of the Neolithic sites of Aswad, Ghoraifé and Ramad, in the Damascus basin (fig. 1), are presented. In each of the sites two aceramic phases are distinguished. The time span covered by the pre-pottery Neolithic habitation is radiocarbon dated from c. 7800 B.C. (basal levels of Aswad I) to c. 5950 B.C. (phase II at Ramad). The chronological correlation between the sites is shown in fig. 6. Aswad and Ghoraifé, with mean annual precipitation of less than 200 mm, are situated in the steppe zone. The natural vegetation of the Ramad area, with 250 mm precipitation annually, is an almond-pistachio forest-steppe.

The earliest Neolithic inhabitants of the Damascus basin (Aswad, phase I) grew Triticum dicoccum and probably Hordeum distichum, Pisum and Lens. In phase II at Aswad, Triticum monococcum, T. aestivum/durum, Hordeum vulgare var. coeleste and probably Linum (usitatissimum) were added to the crop plant assortment. Cicer (chick-pea) appeared later in the charred seed record and remained of minor importance. Emmer wheat was probably the most common cereal. The proportion of free-threshing wheat increased in later periods (phase II at Ghoraife and Ramad). In all three sites, phase 1 levels have markedly higher pulse crop proportions than phase II levels.

van Zeist 1984

W. van Zeist & J. A. H. Bakker-Heeres, *Archaeobotanical Studies in the Levant 3, Late-Palaeolithic Mureybit*. Palaeohistoria **26** (1984), 171–199.

Excavations at Tell Mureybit, on the North Syrian Euphrates River, have been carried out by M.N. van Loon (1964, 1965) and J. Cauvin (1971-1974). Four main habitation phases, covering a time span from 8500-6900 B.C. (conventional radiocarbon years), are distinguished. The foundations of round as well as of rectilinear houses were unearthed. The chipped stone industry of the lower levels (subphase IA) is of Natufian tradition. Polished stone axes appear in phase IV. The faunal remains are all of wild animals. The present-day natural vegetation of the uplands in the Mureybit area is a steppe, whereas the Euphrates valley was naturally covered by poplar forest.

From the various habitation levels samples were secured for botanical examination. Information on the Mureybit charred seeds and fruits is presented in section 3 (figs. 5-9). Grains of two-seeded wild einkorn wheat (Triticum boeoticum ssp. thaoudar) occur in all levels and are quite numerous in phase III samples. Wild barley (Hordeum spontaneum) is also well represented. The size class of the lentil seeds corresponds to that of the wild species. The question is discussed whether the cereal grains were collected in the wild or whether already some kind of plant cultivation (proto-agriculture) was practised. The plant remains themselves provide no conclusive evidence in this respect. On the other hand, the veget-

able remains and the animal bones point both to a change in the exploitation of food resources in phase III.

Marked differences in mean seed and fruit frequencies occur not only between habitation phases but between different areas of the site within one phase. Most of the plant taxa demonstrated for Mureybit could have formed part of the upland steppe. In addition, various species from the river-valley vegetation are represented. The latter must have been of considerable economic importance because of the wood (poplar, tamarisk). It is impossible to determine to what extent the steppe vegetation was exploited by the inhabitants of the site. Pistacia fruits must have been collected rather intensively.

Keywords: Mureybit, late-Palaeolithic, wild einkorn wheat, wild barley, proto-agriculture, steppe environment, river-valley forest.