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Reconciling Nature and Culture After "Naissance des Divinités, Naissance de l'Agriculture"

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Abstract
In *Naissance des divinités, Naissance de l'agriculture*, Jacques Cauvin proposes that agriculture could not have begun without a prior sudden mental transformation, and that the Near East case is exceptional. His emphasis on the primacy of ideas leads him to devalue the influence that foragers have on their environment, and to erroneously assume that agriculture represented a "control" over nature that was qualitatively new. It is clear that ancient people had a deep understanding of their physical, biotic, and sociocultural environments, and societies that succeeded worked within the constraints imposed by all those domains.

Keywords
Jacques Cauvin, Neolithic, PPNA, PPNB, Agriculture, Cultivation, Domestication

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Islamic World and Near East History | Near Eastern Languages and Societies

RECONCILING NATURE AND CULTURE AFTER "NAISSANCE DES DIVINITÉS, NAISSANCE DE L'AGRICULTURE"

N.F. MILLER

Abstract: *In* Naissance des divinités, Naissance de l'agriculture*, Jacques Cauvin proposes that agriculture could not have begun without a prior sudden mental transformation, and that the Near East case is exceptional. His emphasis on the primacy of ideas leads him to devalue the influence that foragers have on their environment, and to erroneously assume that agriculture represented a "control" over nature that was qualitatively new. It is clear that ancient people had a deep understanding of their physical, biotic, and sociocultural environments, and societies that succeeded worked within the constraints imposed by all those domains.*

Résumé : *Dans* Naissance des divinités, Naissance de l'agriculture, *Jacques Cauvin suggère que l'agriculture n'aurait pas pu apparaître sans une mutation mentale préalable et soudaine, et que le cas du Proche-Orient est exceptionnel. L'accent mis sur la primauté des idées l'amène à rabaisser l'influence des cueilleurs sur leur environnement et à supposer de façon erronée que l'agriculture représentait un contrôle de la nature, qualitativement novateur. Les populations anciennes avaient manifestement une excellente connaissance de leur environnement physique, biotique et socioculturel et les sociétés qui leur ont succédé ont œuvré avec les contraintes imposées dans tous ces domaines.*

Keywords: *Jacques Cauvin; Neolithic; PPNA; PPNB; Agriculture; Cultivation; Domestication.*
Mots-clés : *Jacques Cauvin ; Néolithique ; PPNA ; PPNB ; Agriculture ; Pratiques agricoles ; Domestication.*

In *Naissance des divinités, Naissance de l'agriculture*, Jacques Cauvin tries to explain nothing less than the origin of western civilization, beginning with the "Neolithic Revolution" in the Levant and adjacent parts of west Asia. This cultural innovation involved all aspects of human life, "from the most material to the most symbolic":[1] the beginning of settled life and increasing size and permanence of sedentary communities; increasing reliance on cultivation and herding; changes in symbolic expression. These developments are interrelated, but "the beginning of the first manipulation of the natural environment by our species"[2] (the domestication of plants and animals), and agriculture itself, could not have begun without a prior *sudden* mental transformation ('mutation mentale').[3]

Neolithization was the process by which the people living in the Levant first gained 'control' over their environment. Kent Flannery had already emphasized the importance of sedentism for understanding agricultural origins:

> "It may be that the 'demographic change' which made cultivation seem like a good idea in Southwest Asia was an

1. CAUVIN, 1994 : 14.
2. *Ibid.* : 9.
3. Cauvin gives priority to sudden changes in mentality for understanding the present as well as the past. He attributes his philosophical stance against materialist explanations to a kind of "mutation mentale": the idea that scientific advance comes not from an accumulation of facts, but from insights derived from new premises. Creative leaps are unpredictable, and cannot really be explained. In the title of the book, "birth" is a metaphor that evokes the link between intellectual creativity and physical creation, and also reinforces the idea that agriculture was a radical break with the past.

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> increase in sedentary communities—and the latter may have begun in response to changes in socio-political organization which had nothing to do with either climate or population density".[4]

Cauvin agrees that new forms of social organization emerged as people learned to live together, but sedentism was most important as a prerequisite for the mental transformation. It is that transformation, rather than agriculture *per se*, that is significant. In this thesis, the baseline from which the transformation begins is a culture (Upper Paleolithic) that did not make hierarchical distinctions among animals and other living things. By inference, the Upper Paleolithic realm of existence was unitary: plants, animals, and people shared the world, however defined.

With sedentism, villages and their associated burial areas created a connection between the worlds of the living and the dead, and people began to recognize two realms of existence. The presence and proximity of death, though, created a "malaise existentiel"[5] that required resolution: people began to supplicate that other realm. The two planes of existence consist of a 'higher' one, characterized by divinity, and a 'lower' one, characterized by humanity.

The evidence for changes in ideology and symbolic expression is best seen in non-utilitarian cultural manifestations, where art serves as an archaeologically visible indication of religious or spiritual belief. Human, specifically female, images begin to appear. The significance of people making figurines in their own image is that it reinforced the idea that people have control, or at least influence, over the "natural cycles of reproduction in the living world," and that would include death.[6] This is what permitted the mental transformation: if the divine world could control the human, by inference humans could control their own *milieu*. Thus was agriculture made possible, for agriculture is an expression of human mastery of nature. This also accounts for Near East exceptionalism—the cultural successors to those first villagers ultimately came to dominate the world, as they first came to dominate plants and animals.

Cauvin emphasizes the importance of non-utilitarian objects in tracing symbolic systems. The specific examples in a long chain of archaeological evidence are, by the light of knowledge from more recent excavations, arguable[7]: he comments that Natufian figurines are mostly animals; Khiamian figurines are mostly human females; this is evidence of an important, but unexplained *mutation* [sudden transformation] in symbolism. At the cusp of the PPNA, figurines at Mureybet are mostly female and horns of wild bulls are embedded in structures of this relatively large community, even though aurochs is clearly not a major food source. Cauvin dates the onset of this change in figurative art to the PPNA, and sees it continuing through the Bronze Age. Even in the context of 1994, however, he makes at least one unexplained leap in interpretation:[8] By 9000 BC, Khiamian female representations (*représentations féminines*[9]) and bucrania and horns installed in house structures come to stand for personages: "the Woman" and "the Bull" (*la Femme* and *le Taureau*[10]). Several thousand years later, at Çatalhöyük, the Woman has become the Mother Goddess (*la Déesse-mère*). Making this unexplained shift moot, recent discoveries at Göbekli Tepe suggest that, at least in Anatolia, symbolic expression focuses on males and ferocious animals[11] to an extent Cauvin could never imagine.

In the years since Cauvin wrote *Naissance*, many more sites have been excavated, and the amount of excavated plant and animal remains has increased. New theoretical orientations focus on people and their relationships to the land and other organisms. Although some of the facts and archaeological interpretations cited by the author are no longer accepted, his legacy can be seen in recent work by Ian Hodder and his colleagues at Çatalhöyük:[12] for the Natufians, Khiamians, peoples of the PPNA and the PPNB, developments in the realm of food production were incidental, or at least secondary, to the changes in belief systems that were already underway.

Cauvin sought cultural turning points in order to explain how agriculture arose out of a change consciousness specific to Near Eastern culture. Indeed, universal explanations of agricultural origins conflate disparate phenomena, so it is not unreasonable to consider developments in the Near East as a unique case, as Cauvin did. More materialist approaches can lead to a similar conclusion.[13] But even within west Asia,

4. FLANNERY, 1973: 284.
5. CAUVIN, 1994 : 100.
6. *Ibid.*: 101. In this context, he comments that suffering and death were attributes of the "oriental Goddess" since the Neolithic (p. 100).
7. If human figurines are critical evidence of a new separation from animal existence, it is not clear why he ignores the earlier European Upper Paleolithic human figurines.
8. If I understand the French, he acknowledges that although it is not legitimate, he will interpret the figurines based on what we know about symbolism from the same area in later times: " il s'agit surtout d'objets mobiliers qui présenteraient les mêmes difficultés d'interprétation que ceux du Natoufien, s'il n'était à présent légitime de les faire bénéficier de ce que nous savons de leur postérité proche dans la même aire culturelle " (CAUVIN, 1994 : 46).
9. CAUVIN, 1994 : 44.
10. *Ibid.*: 46.
11. PETERS and SCHMIDT, 2004.
12. HODDER (ed.), 2010.
13. HARRIS, 1996: 457.

the paths toward agriculture are not tightly bounded in time and space. Moreover, archaeologists increasingly appreciate that plants, animals and people are "fellow participants in the *same* world, a world that is at once social and natural. And the forms that all these creatures take ... emerge within the context of their mutual involvement in a single, continuous field of relationships".[14]

ENVISIONING TRANSFORMATION

Cauvin considers creativity a kind of sudden transformation, and this colors his understanding of how human beings have lived in the world since the Paleolithic. For him, agriculture depended on a creative break with the past that he dates to the Khiamian. Ancient subsistence practices are not so easily delimited, however, as I hope to show (table 1).

Unavoidably, definitions establish conceptual boundaries, however permeable. The clearer the definition, the stronger the boundary. Yet many of the phenomena implicated in the origins of agriculture change at varying spatial and temporal scales (*e.g.*, degree of sedentism, tool technologies, cultivation, domestication). Furthermore, it is hard to prove that ancient mental states corresponded to archaeological cultures that are are defined within continuous time and space. In *Naissance*, Cauvin demonstrates a way to reduce this power of naming: for each archaeological phase he explicitly points out continuing and new cultural themes. Thus, the roots of village life are seen to go back to the built structures of the Kebaran and Natufian era, even though those people were not yet villagers (*i.e.*, the social structures associated with sedentism, such as dispute resolution mechanisms, had not yet developed). As detailed above, he considers gradual shifts in the material expression of religious symbols. He also looks at agriculture, seeing its development as an intensification in the manipulation of plants and animals that started at the beginning of the Epipaleolithic (Kebaran).

Table 1 – *Simplified Levantine/Euphrates chronology (from* CAUVIN, *1994).*

ca. 6000 cal BC	Ceramic Neolithic
	[8.2 ky climate event, ca. 6200 cal BC]
	Final PPNB/PPNC
ca. 7000 cal BC	PPNB: Early, Middle, Late
ca. 8500 cal BC	PPNA
ca. 9000 cal BC	[Younger Dryas ends ca. 9500 cal BC]
	Khiamian
ca. 10,000 cal BC	[Younger Dryas begins ca. 10,700 cal BC]
	Epipaleolithic–Natufian
ca. 12, 000 cal BC	Epipaleolithic–Kebaran

TERMINOLOGY

To begin, it is useful to define three terms related to food procurement that are relevant to the period of neolithization: domestication, cultivation, and agriculture. All can be said to have begun at some point. Their respective origins raise interesting, but different, questions[15]. For purposes of this discussion, I consider domestication a process, cultivation an activity, and agriculture a system. None are totally free of ambiguity in application.

The process of domestication can usefully be seen from the plant's or animal's point of view. It involves phenotypic changes in a population that result from intentional or unintentional use by people. As a process, the first boundary definition problem for domestication concerns its quantitative assessment. What percent of individual organisms must have the 'domesticated' trait? The simplest example for west Asia is botanical: the presence or absence of the disarticulation scar in barley. Approximately 10% of barley plants in a wild stand will not disarticulate upon ripening.[16] This is the natural genetic-controlled variability upon which selection necessarily works. So, by definition, a barley crop under domestication has somewhere between 10 and 100% tough rachises. George Willcox *et al.*[17] argue that favorable conditions created under cultivation led to increases in grain size that preceded the genetic changes affecting seed dispersal for cereals. For other crops, and animals, too, morphological and behavioral changes reflecting underlying genetic changes are even harder to infer. Regardless, the archaeological identification of domestication is definitional, even as the tracing of the process of domestication is fascinating. For Cauvin, domestication *per se* is a by-product of and incidental to the discussion of (human) neolithization, and I would have to agree with him.[18]

14. INGOLD, 2000: 87.

15. See, *e.g.*, PRICE and GEBAUER, 1995: 6; HARRIS, 2007.
16. KISLEV, 1992.
17. WILLCOX *et al.*, 2008.
18. See also ASOUTI and FAIRBAIRN, 2010.

Cultivation is the intentional preparation of the soil for propagating plants (whether from seed or cuttings). Cultivated plants may provide an important or an insignificant source of a human group's sustenance, and cultivation may be practiced with plants at any stage of domestication. Therefore, although it is relatively easy to define, evidence for cultivation is not so easy to establish. The west Asian weed flora evolved in place[19] in the context of cultivation, so one approach has been to quantify the remains of weedy types. Sue Colledge pioneered the use of multivariate statistics to analyze weed seed assemblages, applying them to sites in the Levant. She identifies cultivation as early as the PPNA.[20] For Mureybet (Natufian to PPNA), Willem van Zeist concluded "the weed-seed frequencies lend no support to the hypothesis of (proto)agricultural practices".[21] Gordon Hillman *et al*.[22] originally presented a strong argument for absence of cultivation at even earlier levels of Abu Hureyra, based on the co-occurrence of wild einkorn (*Triticum boeoticum*) and wild annual rye (cf. *Secale cereale* ssp. *vavilovii*) "consistently accompanied by remains of a perennial species of wild rye" that could not have persisted in cultivated soil. After reassessing the remains, however, Hillman said that the domesticated form of rye was present, and the assemblage "of seeds of wild plants reveal the emergence of a distinctive flora of weeds of cultivation".[23] This revised position is arguable; some think the charred remains arrived on the site mainly as fuel,[24] and others as food.[25]

For discussions of origins, agriculture is usefully distinguished from cultivation. Bruce Smith, for example, defines agriculture as a subsistence system dependent on domesticates.[26] In this case, dependency on domestic species is a continuous variable—percent of calories in the diet coming from domesticates. He defines four categories of subsistence: 'food procurement' (hunting-gathering-fishing) and 'food production' ('low-level' without domesticates, 'low-level' with domesticates, and agriculture). Smith uses percentage of calories in the diet to define the practice of agriculture. His cut-off point for agriculture (>30% of calories from domesticated sources) is not arbitrary (it is based on an ethnographic survey of 200 societies). But it is reasonable to ask: are calories the most significant measure of agriculture? Even among ethnographically known societies, interannual variability in diet could be great, depending on weather and other factors. Finally, as difficult as it would be for a modern researcher to determine the variation and sources of calories, how likely is it that scholars working independently would actually calculate the same percentages based on archaeological subsistence data (from plants, animals, and human bone chemistry), especially for those borderline cases that are most interesting to us.

One dictionary definition of agriculture is "the science or practice of farming, including cultivation of the soil for the growing of crops and the rearing of animals to provide food, wool, and other products" (*New Oxford American Dictionary)*. For a more archaeologically relevant approach, I think of agriculture as a system of food procurement that involves cultivation of plants, that may involve animal husbandry, and the practice of which has so altered the environment (botanical, physical, demographic, social) and has so deeply changed the society and the land itself as to make other subsistence systems untenable in that place. This definition of agriculture highlights subsistence and takes into account its complex, systemic character that creates unique paths of development over time. As with domestication and cultivation, this definition of agriculture is not free of ambiguity.

IS THE QUESTION OF AGRICULTURAL ORIGINS MEANINGFUL ?

One of the issues addressed by Cauvin is the historical specificity of sociocultural developments in the Near East. He has no concern for independent developments elsewhere. For those investigating the worldwide emergence of agriculture, frequently glossed as 'food production', comparisons between world areas require one to characterize disparate activities (planting seeds, propagating root crops from cuttings, herding animals, keeping poultry) and climates (temperate, tropical) as comparable phenomena.[27] Furthermore, such researchers presume that systems incorporating animal domesticates are essentially similar to those that do not.

The universalist view of agricultural origins minimizes the key difference between the development of agriculture in the Near East and the New World—the presence or absence of meat, milk, and dung-producing herd animals, as well as the eventual harnessing of animal traction. It is fair to argue

19. ZOHARY, 1973: 648.
20. COLLEDGE, 1998 ; COLLEDGE *et al*., 2004.
21. VAN ZEIST and BAKKER-HEERES, 1984: 198.
22. HILLMAN *et al*., 1989.
23. HILLMAN, 2000: 378.
24. MILLER, 1996 and 1997a.
25. HILLMAN, 2000 ; COLLEDGE and CONOLLY, 2010 ; WILLCOX *et al*., 2008.
26. SMITH, 2001.
27. See papers in PRICE and GEBAUER, 1995; *Current Anthropology* 50,5, 2009; *cf*. BOCQUET-APPEL and BAR-YOSEF, 2008.

that the expansion of the Near Eastern agricultural system was qualitatively different from agricultural development in the Americas.[28] The fact is, monocrop field agriculture plays to the predilections of the wild wheats and barley. When combined with tractable domesticated animals, the new, powerful system helped create the world we live in today.

Global climate change is sometimes considered the impetus for agricultural origins. Food production appeared independently in several world areas over the course of about five thousand years. This time span has been considered "almost simultaneous"[29] compared to the nearly 200,000 or so years of *Homo sapiens* existence on the planet. If, however, the post-Pleistocene climate changes that are said to be implicated in early agriculture occur on the order 500–1000 years, but the 'near-synchronous' worldwide development of domestication ranges over more than five millennia, can we really call these developments simultaneous?

Nevertheless, even if climate change did not make agriculture inevitable, it is not irrelevant. It is useful to think of climate not so much as a causal factor, but as setting the background conditions that affected the distribution and density of all organisms, not just people. Evaluations of the influence of climate specifically in west Asia have changed over time. For example, did a post-Pleistocene expansion of prime grasslands or grassland-oak savanna provide a stable food source that encouraged sedentism?[30] For some years, the Younger Dryas cold spell was implicated in these changes, forcing people to cultivate food plants.[31] However, as Cauvin had already proposed in 1994, it is more likely that this climate change is not relevant to the increasing dependence on cultivated crops in west Asia, because, among other things, "agriculture depends on stable climatic conditions which were not established until after the Younger Dryas".[32] It is important to remember that human populations respond more to *conditions* created by climate change than climate *per se*.

The search for universal explanations has not been totally abandoned, though more attention is being paid to the details of individual cases.[33] Considering the many ways agriculture is practiced, it may be time to accept that within the culture of Archaeology, 'agriculture' may well be a scholarly abstraction, not some unitary phenomenon requiring a universal explanation. Defining 'agriculture' by its end begs the question of equifinality. If there were multiple pathways to the same end (*i.e.*, agriculture), no single explanation for its appearance will suit all cases.[34] I consider agriculture to be a system that develops over time in a non-cyclical way, which is consistent with Cauvin's usage.

WHEN *WAS* AGRICULTURE ESTABLISHED IN THE NEAR EAST ?

A prerequisite of west Asian agriculture was, depending on your perspective, decreased mobility or increased sedentism. The mobility-sedentism continuum is multifaceted with variables such as: length of stay at any one location, frequency of moves, proportion and social characteristics of the group members who move (male/female, old/young). Hard to define, degrees of sedentism are inferred by changes in size, structure, and permanence of sites. People redistribute themselves on the landscape according to conditions.

Cauvin emphasized the role of sedentism as a force for spiritual transformation. Sedentism also changed people's relationship to the conditions of existence: plants, animals, and each other (*i.e.*, food, family, and friends). Early Natufian communities became less mobile, so it is clear that they had solved the problem of obtaining a regular food supply. Arlene Rosen has shown that Natufian subsistence changed according to environmentally-conditioned plant distributions mediated by technological innovations such as grinding stones. Sedentism in a seasonally productive environment like the Levant implies that the Natufians had devised some means of seed storage. Rosen proposes that the goal of Natufian food choices was to maintain as stable a food supply as possible.[35] For the Natufians, this was accomplished through diversification and storage rather than mobility. This strategy was quite stable until the cool dry conditions of the Younger Dryas effectively reversed Natufian sedentism in the southern Levant.[36]

The trend toward sedentism was reestablished in the PPNA. Willcox *et al.* provide a variety of evidence and argument that unlike the Natufian PPNA sedentism is likely to be associated with cultivation:[37] Storage is well attested by charred rodent droppings. Archaeological finds of seeds of cereals and pulses from sites that are outside their natural habitat are further good evidence of cultivation. Insofar as cultivation expands the

28. HARRIS, 1996.
29. PRICE and GEBAUER (eds.), 1995: 5.
30. MCCORRISTON and HOLE, 1991.
31. MOORE and HILLMAN, 1992; BAR-YOSEF and BELFER-COHEN, 2002.
32. WILLCOX, 2005: 534; see also ABBO *et al.*, 2010.
33. See ZEDER and SMITH, 2009.
34. See FLANNERY, 1973; TERRELL *et al.*, 2003.
35. ROSEN, 2007 and 2010.
36. BAR-YOSEF and BELFER-COHEN, 2002.
37. WILLCOX *et al.*, 2008; for pulses, see also TANNO and WILLCOX, 2006.

Table 2 – *Percent ubiquity of* Hordeum (*barley*) *and* Triticum/Secale (*wheat, rye*)*; total count of* Hordeum *and all* Triticum *and* Triticum*/Secale* (*data in* WILLCOX et al.*, 2008*).

Site	Qaramel	Tell 'Abr	Dja'de	Jerf el Ahmar
Distance from 400 mm isohyet (km)*	7	35	48	63
Annual precipitation (Willcox et al. 2008)	350	ca. 300	300	250
Approx. date cal BP	10100	9700	9200	9500
Hordeum (% ubiquity)	36	57	79	91
Triticum-Secale (% ubiquity)	46	86	64	81
Ratio of % ubiquity, *Hordeum: Triticum-Secale*	0.78	0.66	1.23	1.12
Hordeum (count)	217	190	3763	9639
Triticum & Secale (count, includes einkorn)	2278	3089	1422	2606
Ratio of counts, *Hordeum: Triticum & Secale*	0.10	0.06	2.65	3.70

* Annual precipitation between 400 and 200 mm isohyets declines at a rate of approximately 1.5 mm/km.

habitat for weedy plants, we might also expect changes in wild seed assemblages to include more weedy types. If, as Willcox *et al.* assume, most charred seeds in occupation debris represent food and crop-processing debris, further archaeobotanical correlates of cultivated assemblages include a decline in small-seeded food plants and a concomitant increase in proportions and ubiquity of the wild ancestors of einkorn and barley, two of the 'founder crops'. They have also proposed that an increase in barley breadth and thickness at Jerf el Ahmar is a possible result of cultivation.

The first weeds were elements of the native vegetation that thrived on disturbed ground.[38] Archaeological context is very useful, therefore, in distinguishing collected food from weeds. For example, concentrations of charred wild seeds, such as *Polygonum* at Mureybet,[39] are more securely interpreted as food remains than are highly diverse samples mixed with charcoal, as found at Mureybet itself and some other sites. I have argued specifically that many of the charred seeds at Epipaleolithic Abu Hureyra originated in gazelle dung.[40]

There is good reason to think that subsistence and land use practices will vary according to environmental conditions, especially moisture. For example, dung fuel replaces wood in drier climes, so one might expect more seeds relative to wood charcoal from north to south along the Euphrates, as can be seen at some Bronze Age sites.[41] Although seed/charcoal data are not available for the Epipaleolithic and PPNA sites, wild seed data interpreted in time sequence by Willcox *et al.* may also be interpreted along a moisture cline: not only do the ubiquities of wild seeds such as *Stipa*, *Polygonum*, Cyperaceae, and the Panicoid grasses diminish over time, they also generally decline the further north you go along an axis that runs through Abu Hureyra, Mureybet, Jerf el-Ahmar, and Dja'de.[42] That is, with less animal dung burned, seeds decline in archaeobotanical assemblages.

We also would expect crop choice to be influenced by moisture. Indeed, in both Bronze Age[43] and Neolithic[44] sites along the Euphrates, relative proportions of domesticated wheat and barley follow a north-south cline, with wheat more important in the moister north, and barley more important in the south. Willcox *et al.* interpret such data from Jerf el-Ahmar, Dja'de, Tell Abr, and Qaramel chronologically.[45] Ordered in time from latest to earliest, however, these sites are also ordered spatially from driest to most moist. Based on the ubiquity and count data, the distribution of *Hordeum spontaneum* grain compared to *Triticum-Secale* grain follows the expected moisture cline better than it does the chronological. The two sites closest to the 400mm isohyet exhibit the lowest barley: wheat ratios. Barley is more prominent in the two assemblages from the drier area (fig. 1, table 2). In other words, the increase in wheat relative to wild barley cultivation over time might at least in part reflect its increased viability in moist regions. Even though some of these data are ambiguous, grain size data and the archaeological contexts of the sites support the view that cultivation was practiced during the PPNA.

Beginning about 9500 cal. BC, the first wild ancestors of the founder crops (wheats, barleys, pulses) were being brought into cultivation; by *ca* 9000 cal. BC, plant cultivation may have

38. See DE WET and HARLAN, 1975.
39. VAN ZEIST and BAKKER-HEERES, 1984 (1986).
40. MILLER, 1996 and 1997a; HILLMAN *et al.*, 1997, support their now-conventional view that the Abu Hureyra charred seeds are food remains.
41. MILLER, 1997b.
42. WILLCOX *et al.*, 2008: fig. 5.
43. MILLER, 1997b.
44. WILLCOX *et al.*, 2008.
45. *Ibid.*

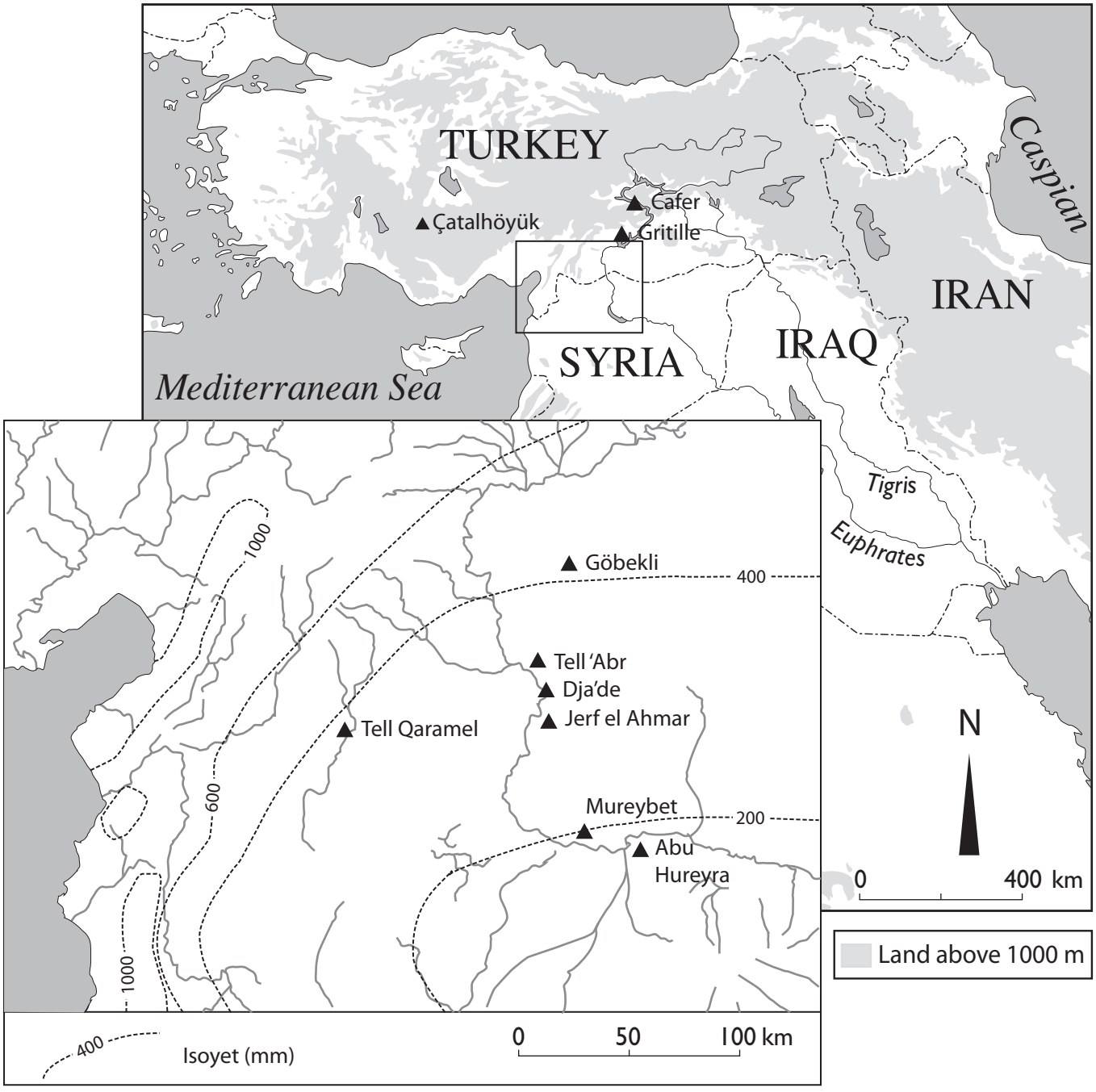

Fig. 1 – *Map of sites mentioned in text (from* WILLCOX et al.*, 2008).*

been widespread, initiating the domestication of cereals and pulses. By the beginning of the PPNB, the primary cultivated plants were domesticated varieties. Recent research has shown that for the most part, the individual species were domesticated once or twice where wild stands grew naturally, and their cultivation spread from those centers.[46]

46. NESBITT, 2002; WILLCOX, 2005; see ZOHARY, 1999.

The creation of cultivated fields near settlements, selective hunting, and penning changed the relationship between people and animals, too. As with plant domestication, archaeological correlates are not totally unambiguous. Control over reproduction distinguishes domesticated from merely tamed or tended animals,[47] and the process of domestication that can be traced with a variety of materials and methods.[48] There are various ways to look at degrees of interference in the life cycle, such as selective culling and animal penning, that might be precursors to selective breeding.[49] Shifts in kill-off patterns, some bone size reduction, and a decline in the proportions of never-domesticated vs. eventually domesticated species begin to appear in the early PPNB (8500 BC) in the Taurus-Zagros arc.[50] Melinda Zeder has examined a variety of statistical indicators of herd management that can be applied to bone assemblages;[51] by the time particular morphological changes appear towards the end of the PPNB, the human-animal domestication relationship was already established. Good evidence for animal penning would be layers of dung (*i.e.*, not fuel) identified by chemical, phytolith, soil micromorphological data,[52] as has been recognized at Çatalhöyük,[53] but that evidence is relatively late.

Bone assemblages show different rates of the use of domesticates, but overall increases in the percentage of domesticated taxa appear in the Euphrates region at about 8500 cal. BC (about 1000 years later than plant domestication; animal manipulation followed a separate path, originating earlier in the Taurus-Zagros arc[54]). As with plant domestication, sheep, goat, cattle, and pig appear to have been domesticated independently of each other in different places.[55] As can be seen along the Euphrates, "a significant proportion of the spatial variation in animal exploitation patterns, and thus the regional trajectories of early animal domestication and stock-keeping practices that we have documented, are accounted for by regional climatic differences across South West Asia".[56] The remains from three multi-phase PPNB sites along the Euphrates (from north to south: Cafer, Gritille, and Abu Hureyra) exemplify these processes. The bone assemblages are suggestive of domestication, but do not yet exhibit the associated morphological traits.[57] Yet the seed assemblages show strong evidence for increasing reliance on domesticated herd animals.[58] First, cereals increase relative to pulses, presumably because animals were sufficiently available to replace pulses for dietary protein. Second, barley increases relative to wheat, perhaps to provide fodder, as pasture gave way to cultivated land or sedentary villagers needed to provide stored fodder in the dry summer or snowy winter. Third, the proportion of small legumes, an indicator of healthy steppe, declines relative to other wild seeds. If most of the seeds of wild plants come from animal dung burned as fuel, that decline at Abu Hureyra could indicate the beginning of overgrazing, or at least, the impact on the natural vegetation of controlled herds (whose access to fodder was more restricted than that of wild herds).

What characterizes the PPNB, then, is the integration of separately domesticated plant and animal taxa into an agropastoral system.[59] During the PPNA, the cultivation of cereals and pulses supplemented by some hunting and gathering could have provided a satisfactory way of life: from a dietary perspective, the pulses and cereals provide complete protein; pistachio, almond, and to a lesser extent acorn, common to much of the region, could supplement fat from hunted animals; pulses would help maintain soil fertility if cultivated plots were farmed year after year. The addition of domestic animals would create a more reliable food supply, which in turn allows for higher population densities. Available fat, available protein, and soil fertility (through the application of dung) would be enhanced immediately. The resulting system could be very responsive to any changes in environmental conditions, simply by shifting crop choice, the balance of cultivation and herding along an "agropastoral continuum".[60] In case of severe crop loss, the "walking larder" would reintroduce mobility as a subsistence strategy.

The flowering of the PPNB system appears to have occurred during a period of ameliorating climate.[61] Increasing reliance on domesticated plants and animals in the context of sedentism and population growth created conditions that made agriculture both possible and desirable. The Near Eastern crop complex was particularly suited to provide stable yields from one year to the next, given the normal interannual fluctuations in rainfall.[62] Whether one argues for cultivation of domesticated

47. BÖKÖNYI, 1969.
48. ZEDER *et al.*, 2006.
49. See HECKER, 1982.
50. *E.g.*, HELMER *et al.*, 2005; HONGO *et al.*, 2009.
51. ZEDER, 2005.
52. SHAHACK-GROSS, 2011.
53. BULL *et al.*, 2005.
54. ZEDER, 2008: fig. 1.
55. ZEDER, 2009; CONOLLY *et al.*, 2011.
56. CONOLLY *et al.*, 2011: 544.
57. HELMER, 2008; STEIN, 1989; LEGGE and ROWLEY-CONWY, 2000: 461-471.
58. MILLER, 2002.
59. HARRIS, 2002.
60. See MILLER *et al.*, 2009.
61. ROSEN, 2011.
62. ABBO *et al.*, 2010.

plants as early as the Epipaleolithic (*e.g.*, at Abu Hureyra),[63] or a long period of pre-domestication cultivation during the PPNA,[64] it would be difficult to argue for the primacy of *agriculture* until the irrevocable landscape-transforming subsistence system of the PPNB came into being.

The PPNB is the first period characterized by the full complement of west Asian domesticates: wheats, barleys, pulses, and sheep, goat, cattle, and pig. It increasingly appears that the end of the PPNB was marked by some discontinuity in settlement: many sites appear to be abandoned, others are founded, although some, such as Çatalhöyük,[65] are continuously occupied. Whether this was the result of climate deterioration, such as the 8.2k climate event,[66] or some failure of social integration or agricultural expertise, the fact remains that the pottery Neolithic recovery continued and furthered the agricultural system of that earlier tradition. Since the PPNB, demographic, landscape, cultural, economic, political and even spiritual changes made it impossible to abandon an agricultural subsistence base.[67] As a cultural materialist, I regard the demographic and landscape changes suggested by the archaeological record of west Asia as necessary and sufficient conditions for the establishment of agriculture there. Yet it was the knowledge and experience of ancient people as participants in ongoing sociocultural and ideological systems that underlay that development.[68]

THE "ORIGIN" OF ENVIRONMENTAL MANIPULATION

Cauvin's project in *Naissance* is to demonstrate that the "current state of the human species is rooted in the Neolithic Revolution [which occurred] not only in the domain of the exploitation of the environment … but in the culture itself, and in its mental structures".[69] The logic of this argument depends on a questionable premise: that the people of the Upper Paleolithic were at the mercy of 'nature', that they were incapable of changing it, and that cultivation and animal tending leading to domestication are qualitatively different from other forms of food procurement.

Another approach is to pay attention to the full range of interactions between people and the rest of the natural world. With specific reference to agricultural origins, Smith applies the ecological term "niche construction" to describe the observation that people, like other organisms, help create the conditions for their own persistence.[70] Scholars have begun to recognize and actively seek evidence of human impact on the environment. Increasing charcoal density in pollen cores from southwest Anatolia suggests the use of fire to control vegetation to a degree that might have limited early Holocene forest advance in Anatolia.[71] Even without cultivation, people might have encouraged the spread of desirable plants. Wild wheat, broadcast on unprepared ground, will sprout; 'sowing' wheat and barley in this way could have been an intermediate step on the way to cultivation in the Levant that was made possible by the botanical qualities of those particular plants.[72] There is evidence for human impacts on small animal populations: easy-to-catch prey (*e.g.*, tortoise) get smaller, and harder-to-catch prey (*e.g.*, birds) become more numerous in assemblages.[73]

Cauvin's thesis privileges symbolic systems; "niche construction"[74] privileges ecological systems. One way archaeologists are just beginning to synthesize these approaches is through landscape ethnoecology, which "focus[es] on people's knowledge of and interactions with landscape."[75] A key concept is "folk ecotope": where ecotope refers to "a partition of a 'subsistence space' into *patches*".[76] Folk ecotopes are kinds of places "recognized as significant in the landscape ethnoecology by members of specific local communities or cultural groups".[77] Although it is unreasonable to think we can know whether ancient people constrasted the folk ecotopes 'cultivated ground' with 'wilderness' or 'fallow', the landscape approach opens the door to thinking about this question. For example, at Çatalhöyük, "the domestic versus wild distinction that is of such great significance to modern researchers is not upheld."[78] Johnson and Hunn point out that "it is not useful to create a categorical binary contrast between 'natural' and 'anthropogenic' landscapes because in fact this varies amongst cultures and can best be construed as a *continuum*".[79]

63. Hillman, 2000.
64. Tanno and Willcox, 2006; Willcox *et al.*, 2008.
65. Asouti, 2009.
66. Robinson *et al.*, 2006.
67. See Goring-Morris and Belfer-Cohen, 2010.
68. See Ingold, 2000: 27-39 for a discussion of the limitations of a strict adaptationist view.
69. Cauvin, 1994 : 13.
70. Smith, 2007.
71. Roberts, 2002.
72. Kislev *et al.*, 2004.
73. Stiner *et al.*, 2000.
74. *E.g.*, Smith, 2007.
75. Johnson and Hunn, 2010: 1.
76. Hunn and Meilleur, 2010: 15.
77. Johnson and Hunn, 2010: 2.
78. Twiss *et al.*, 2009.
79. Johnson and Hunn, 2010: 3.

Thus, can we even speak of the "origin" of human environmental manipulation? What if, like domestication and cultivation, environmental manipulation occurs along a continuum? And what if that continuum, rather than being linear, is multidimensional? Cultivation is just one of many techniques people might use to obtain food. People might simply harvest wild plants, but they may manipulate vegetation by selective harvesting, weeding, or protection, as well as burning to encourage new growth for their own food, or to provide browse for prey. Hunted animals, too, may be selectively culled to ensure a steady supply. These practices are not mutually exclusive. Such an eclectic approach to food procurement is difficult to model because it creates a complex web: each different subsistence activity may be practiced on a continuum of space, time, and intensity. Presumably, the knowledge that plants come from seeds (and that baby mammals come from adult female pregnant mammals) was widespread during the Upper Paleolithic. More to the point, Hillman[80] and others have rightly emphasized that even in the Paleolithic, people must have had intimate knowledge of their physical and biotic environment in order to survive.

Flannery coined the term " 'broad spectrum' revolution" for the apparent "broadening of the subsistence base to include progressively greater amounts of fish, crabs, water turtles, mollusks, land snails, partridges, migratory water fowl (and possibly wild cereal grains in some areas?)" by 20,000 years ago, during the Upper Paleolithic.[81] Thanks to decades of excavation, his original formulation has been extended by our knowledge of the food taxa exploited, both animal[82] and vegetal.[83] Two sites, most spectacularly Ohalo II,[84] and also Abu Hureyra,[85] are the most influential ones reported to date. Although one might quibble with the suggestion that all burnt plant remains are food, much of the seed evidence is from sites associated with food processing innovations (notably ground stone, perhaps storage facilities, and later, in the PPNB, roasting pits), which implies at least knowledge of how to harvest and process these items. As early as the Epipaleolithic, we can see that those activities were landscape transforming.

By the PPNB, agricultural production fed relatively large populations. This new subsistence niche affected the circumstances of human existence: the physical (cultivated fields; changes in soil chemistry, fertility; soil erosion in some places), the biotic (new species—domesticates, perhaps field weeds, commensals, vermin, pests), the technological (grinding, storage, animal penning), the social (new living arrangements in settlements—dispute resolution issues, organizing how to find mates; investments in storage, fields, and herds that might have influenced concepts of ownership), the cultural (transmission of knowledge of farming), and even the spiritual (as evidenced by non-utilitarian artefacts).[86]

Millennia of environment-changing subsistence practices came together in the PPNB. Natufian subsistence had been geared toward evening out food supplies,[87] critical in an uncertain environment. Successful agriculture based on plant cultivation requires yield stability from one year to the next, and therefore depended on a relatively equable climate.[88] After the Younger Dryas, climatic conditions encouraged the shift towards cultivation that we see in the PPNA in western West Asia. In the PPNB, the addition of animal husbandry to the system created the powerful base on which subsequent societies depended. In the face of non-random, variable conditions, exploitation of the agropastoral continuum provided the necessary flexibility to maintain society.

CONCLUDING REMARKS

"Erst kommt das Fressen, dann kommt die Moral ?"[89]

We can only even begin to understand the past through our understanding of the present. Cauvin's project was to understand the origins of western civilization through archaeological evidence, from the beginning in the Upper Paleolithic to its inexorable conclusion, but he knew the end of the story he was trying to tell. For Cauvin, people's belief that they could control nature preceded their control of it. I suggest people have never controlled nature. More valid is the premise that the outstanding characteristic of present-day globalized western civilization is not the fact, but the *belief* that humans have control over the environment. Most obviously, global warming as well as proposed geo-engineering solutions express this 'emic' view.

Can we project this belief far back into the past? In the Neolithic as well as the Bronze Age, archaeological evidence shows that agricultural practices were constrained by cli-

80. HILLMAN, 2000.
81. FLANNERY, 1969: 77.
82. *E.g.*, STINER *et al.*, 2000.
83. *E.g.*, WEISS *et al.*, 2004: 9553.
84. KISLEV *et al.*, 1992.
85. HILLMAN, 2000.
86. *Cf.* CAUVIN, 1994; HODDER, 2010.
87. ROSEN, 2010.
88. ABBO *et al.*, 2010.
89. Loosely: "Food first, then we can talk about morality" (BRECHT B., *Die Dreigroschenoper/The Threepenny Opera*).

mate.[90] The ability to secure a reliable and adequate food supply allowed these societies to persist. By 3000 years ago, we have written evidence of our 'ancestors' stated motivations. By their own account, the culture of ancient Israel, ancestral to the Judaeo-Christian-western tradition, prized fertility in field and family, the ongoing renewal of creation. For example, Tikva Frymer-Kensky observes that eighth century BC pillar figurines "are a visual metaphor, which show in seeable and touchable form that which is most desired. In other words, they are a kind of tangible prayer for fertility and nourishment".[91] Is there any reason to doubt that by the Bronze Age, a goal of religious practice was directed, at least in part, to successful production and reproduction?

For each succeeding generation, its own past constrains its own present. This is true for archaeologists as well as the people we study. The mentalists among us emphasize the persistence of memory, knowledge, and tradition.[92] The materialists emphasize niche construction. The landscape approach, which acknowledges that people live in a physical, biotic, *and* social environment that they create through thought and deed, can reconcile these opposite orientations.

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90. CONOLLY *et al.*, 2011; MILLER, 1997b and 2002; RIEHL, 2009; SMITH and MUNRO, 2009.
91. FRYMER-KENSKY, 1992: 159-160.
92. *E.g.*, HODDER and CESSFORD, 2004.

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