Introduction: Some Comments on the History of Research

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Human experience demonstrates that every collection of papers opens with an "Introduction," in which the biases of the organizer are reflected in the selection of papers and the points that he or she chooses to stress in the opening remarks. This one is no different, as I am much more at home with the West Asian scenery than with the other parts of the Old World. As it happens, this is also the best known region (Watson 1995), one with a relatively long history of research. In introducing these current papers, I shall first outline this history, but I have decided not to classify the models proposed by various scholars into a series of set up categories. As will be shown below and stressed in the concluding chapter, most writers, whether practicing archaeologists, botanists, and zooarchaeologists, or purely theoreticians, used the same ingredients, just in different doses.

The transition from foraging to agriculture was a major cultural and economic change that left its imprint on the collective human memory, expressed in various parts of the world as mythological stories. Judging by the myths, the shift from the easy-seeming lifeways of hunter-gatherers to the organized, demanding, seasonal activities of farmers and herders, is an important theme. In the Biblical story, for example, it is retold as the expulsion of Adam and Eve from the Garden of Eden. Thus, relying simply on the collective memories of human societies in Europe and western Asia, the Neolithic Revolution, as a socio-economic transformation, must have been a deep-seated cultural shock.

It is, therefore, not surprising that scholars, mainly from the 18th century onwards, became interested in the period of societal evolution not documented by early historians (see Wright [1971] for a fuller historical survey). The accumulation of ethnographic knowledge, the identification of past societies as mirror images of 'primitive society' (Kuper 1988) produced materials allowing the hypothetical reconstructions of past cultural evolutionary trajectories. One of the early writers was George P. Marsh (1864: 3), who summarized the importance of human evolution in the following statement: "In the rudest stages of life, man depends upon spontaneous animal and vegetable growth for food and clothing, and his consumption of such products consequently diminishes the numerical abundance of the species which serve his uses. At more advanced periods, he protects and propagates certain esculent vegetables and certain fowls and quadrupeds and, at the same time, wars upon rival organisms which prey upon these objects of his care or obstruct the increase of their numbers. Hence, the action of man upon the organic world tends to subvert the original balance of its species, and while it reduces the numbers of some of them, or even extirpates them altogether, it multiplies other forms of animal and vegetable life."

Long before systematic excavations began, various pathways to agriculture were proposed by different scholars. Perhaps the most interesting notions were those offered by Alphonse de Candolle. His views, as expressed in the volume "Origine des Plantes Cultivées" (1883; English translation, de Candolle 1884) indicated the need to place the geographic origin of cultivated species, and that geology and archaeology would be disciplines critical to the furthering of this investigation. He felt that historically, the main regions for the emergence of cultivation were China, southwest Asia (including Egypt), and intertropical America. He thus pointed out that the search should concentrate on the original centers of the cultivation of plants, in many ways anticipating later studies by at least sixty years. De Candolle and other scholars, such as H. L. Roth (1887), viewed the process that led to the establishment of agriculture as beginning with the domestication of animals, with plant cultivation occurring later. This view of the prehistoric sequence prevailed for a very long time. When it began to change, scholars thought that both plants and animals were domesticated at the same time. Only with recent progress in the gathering of archaeobotanical and zooarchaeological evidence has it been recognized that plants were cultivated first, followed by animal domestication.

Among the first practitioners of archaeology who set out to find concrete evidence, was R. Pumpelly, an American geologist whose pioneering work in the field influenced others. Pumpelly was familiar with the works of Louis Agassiz on the Glacial Pleistocene, and the potential impact of climatic changes on vast geographic areas. His fieldwork in Anau, Turkmenistan, was aimed at testing the idea that the gradual drying of central Asia motivated isolated populations to initiate cultivation (Pumpelly 1908). In addition, he also hypothesized that post-Pleistocene desiccation was the driving force behind the Aryan migrations into Europe. Additional early proponents of climatic change as a major force that triggered technological changes were E. Huntington and S. Cushing (1921). They envisioned the need for irrigation as a vital component in agricultural systems, and therefore sought the origins of this type of subsistence in the floodplains of the major rivers. Their explanation centered on the human need for plant food and lacked any consideration of cultural aspects.

A new step in the search began when Neolithic archaeology became accepted as a subject by both Palaeolithic and Bronze Age archaeologists. One of the first to define the transition in archaeological and cultural aspects was George G. MacCurdy (1926: 156). At the time "the Neolithic Period was first referred to... as the age of polished stone implements." Anticipating later research, he recognized that the essence of this period centered on "the control of food supply (that) made village life possible, and this in turn, led to societal organization, without which discipline, important works such as fortification, megalithic monuments, lake villages etc., could never have been consummated." This was followed by V. Gordon Childe's coining of the term "the Neolithic Revolution," in 1926.

In a remarkable way, Childe amalgamated climatic change and social and economic transformation into a coherent hypothesis. He saw the Neolithic revolution as taking place in major river valleys such as the Nile, Euphrates, Tigris, Indus, and Yellow River. In his volume "The Most Ancient East" (originally published in 1926), rewritten and published as "New Light on the Most Ancient East" (Childe 1953), Childe regarded the Neolithic Revolution as one of "the greatest moments – that revolution whereby man ceased to be purely parasitic and, with the adoption of agriculture and stock raising, became a creator, emancipated from the whims of his environment" (Childe 1953: 1-2). Based on the preexisting ideas of R.

Pumpelly, Childe indicated that the centers of the Neolithic revolution in the Near East and the Punjab, were also the regions that currently enjoy "the hottest and driest climate" (Childe 1953: 17). Building upon the geological knowledge of his day, he saw the Holocene climatic regime which followed deglaciation as the result of a gradual process of drying, to which humans and their stock were also contributors, and he compared it to the dust bowl of Oklahoma. As exemplified by his writings, Childe espoused the ideas of the climatic change as a trigger for the ensuing socio-economic changes.

In the same decade, studies by the Russian botanist N. I. Vavilov (1926) pointed towards the primary and secondary centers where the wild progenitors of domesticated plants are found. He demonstrated that the origins of agriculture should be searched for in different loci of the Old and New World. His writings influenced numerous researchers but it was only several decades later that carbonized plant remains became subjects for systematic collection in prehistoric excavations.

Studies of animal remains were conceived as part of the routine archaeological investigation, due to cooperation between prehistorians and zoologists. In the 1920s and 1930s, palaeontologists working on bone collections from Neolithic sites began to pay attention to aspects of animal domestication, while during previous centuries, travelling naturalists had already documented the presence of wild animals in their habitats.

Following the Second World War, various regions witnessed extensive archaeological investigations, some of which focused on the questions of agricultural origins. Arguably the most influential research on this problem in southwest Asia was the project conceived and directed by Robert Braidwood and his associates (Braidwood 1951; 1952; 1975; Braidwood and Howe 1960). Employing the basic concept that the search should be in the belt of the natural habitat of the cereals, Braidwood and his team carried out fieldwork in the Zagros foothills (Iraqi-Kurdistan), and later in the Taurus foothills (in southeast Turkey). In both cases, the sites were located within the natural habitat of today's wild cereals (Harlan and Zohary 1966). Unfortunately, no signs of the earliest farming communities were found there, probably because during the expected phase of incipient cultivation, due to the conditions of the Younger Dryas, these plants were not available in the same area but were available further west and south (Hillman 1996; Bar-Yosef 1998). The multi-disciplinary approach that characterized the Braidwood project served as a model for others. Braidwood began with the by now famous (Young et al. 1983) "gap chart," searching for the archaeological remains of an unknown period, which in current terminology, falls within the Late Epi-Palaeolithic and Pre-Pottery or Aceramic Neolithic. He also suggested an anthropologically oriented terminology, by defining the type of economy and social organization of the various populations involved in the transition to agriculture. By subdividing western Asia into sub-regions, he was able to hypothesize that the change began in one sub-region and diffused to neighboring ones (Braidwood 1952). Braidwood's stressing of the cultural determinants in the origins of cultivation was in part related to the field observations of Wright (1993), who determined that the Zagros glaciers retreated long before early farming sites appeared in the record and therefore, no climatic change could be considered as a trigger.

Moving beyond simple climatic-driven models Binford (1968; 1983) and Flannery (1965; 1969; 1973), directed new attention to how population growth caused cyclic demographic pressure in the optimal regions where foragers survived more or less in equilibrium with local resources. Binford suggested that when environmental changes cause rapid reduction of food sources, and territorial packing of groups increases the pressure on the available resources, cultivation would be advantageous. Flannery, along a somewhat similar line of reasoning, proposed that one of the conditions that preceded the later transformation was the 'broad spectrum revolution,' when hunter-gatherers considerably expanded the range of exploited food resources. The ensuing increase in population would then have led to excessive pressure on food supplies. Thus, cultivatable plants and domesticable animals were moved into marginal environments where the original farming communities were established (Flannery 1969; 1972; 1973). These models were followed by an even more encompassing argument that population growth was inherent among human groups and had accelerated since the Last Glacial Maximum (Cohen 1977). From Cohen's perspective, food shortages caused by the climatic change at the end of the Pleistocene had inevitably led to the beginning of cultivation, and that this event was global and not only applicable to southwest Asia.

Estimating the role of 'population pressure' (Smith and Young 1972) was and still is a major topic of discussion. Whether as a relative measure or an absolute one, population pressure should be revealed through the gathering of information from archaeological surveys and site size. One may see the increasing number of people as the determinant variable for technical changes as stated by the economist E. Boserup (1965), whose book, "The Conditions of Agricultural Growth," is often cited. In it, she writes, "as the density of population in the area increases, the fertility of the soil can no longer be preserved by very long fallow and it becomes necessary to introduce other systems, which require a much larger agricultural labor force." In her study she attempted to denounce the proposition of Malthus and his followers, which predicted that population increase depends on technical changes resulting in increased yields. In a later book (Boserup 1981), she further explained why the modern world does not need to fear the old, Malthusian-predicted consequences. According to her interpretation, as the population increases, extensive agricultural systems give way to intensive ones that accelerate food production. However, the world market economy of the second half of the twentieth century can hardly serve as an analogy for the emergence of food production in prehistory. Importantly, Boserup challenged common views and stated that "prehistoric populations had a choice between adapting populations to resources by means of fertility control and adapting resources to population by means of changes in the consumption patterns, migration, or technological changes" (Boserup 1981: 38).

Despite the increasing attention given to the roles of technology and population growth, researchers have continued to reflect upon the potential effects of climatic change. Thus, for example, H. Wright (1976; 1977) warned against using the identification of Cerealia in the Zeribar pollen core as indicating early cultivation. Instead, he suggested that cereals were not present in the Mediterranean vegetation of southwest Asia during the Terminal Pleistocene, but arrived there with the climatic improvements that followed deglaciation. He placed their source area in western Africa, specifically identifying Morocco

as the original location. This contention was espoused by several archaeologists, but in view of the later retrieved and published carbonized material from sites such as Ohalo II, a site dated to 19,000 BP (Kislev et al. 1992), this proposal has recently been abandoned (Wright 1993). Drawing on earlier observations by Wright concerning the origins of cereals, the critical location of the Levant between the rain-bearing westerlies and monsoon systems, and the topographic diversity of the region, McCorriston and Hole (1991) argue that the ecological effects on the local vegetation were a precondition for the domestication of annuals. From their perspective, the rise of temperature in the early Holocene, erosion, and human activities resulting from sedentism contributed immensely to the deterioration of the environment and thus to the propagation of annuals, including cereals. As the disturbance of previous vegetation associations continued, the cereals spread from the southern Levant to its northern reaches. The authors see the increasing Early Holocene seasonality, and the desiccation of inland lakes, along with the effects of sedentism and depletion of resources as the combined factors that triggered humans to converge around lakes in the Jordan Valley and domesticate cereals and legumes.

Moving from a regional view to a global one, the world of social archaeology provides useful perspectives. Scholars such as Bender (1978) stressed the importance of 'surplus' production: materials such as food and expendable or durable gifts, which through exchange within the kinship, lineage or larger social unit, assured the mutual survival of the population. Individuals operating within the alliance structures were successful in accumulating 'surplus' by initiating food production through cultivation in the marginal areas (as with the Flannery model). Thus, Bender envisioned the emergence of tribal organization (often referred to today as complex hunter-gatherers) as taking place before the shift to agriculture. Another example of the social approach was proposed by Hayden (1990). He views "competitive feasting," as exemplified by Northwest Coast Native American cultures, as a valid reason for the cultivation of cereals with the intention of creating surplus. Feasting is common among foragers and farmers for various reasons, and social competition is part and parcel of human behavior, as primate studies have demonstrated. Unfortunately, the archaeological record of southwest Asia indicates that the surplus in food supplies and the massive volume of exchange or trade in precious commodities appear after the development of agriculture and the initial phase of systematic cultivation. In a later version, Hayden retracts the 'competitive feasting' hypothesis, but stresses "the use of food to enhance individual or corporate group power" (Hayden 1995: 289). The observation that food is used as a commodity for exchange and control is undeniable. It was recorded as an essential component in exchanges between farmers and foragers (Spielmann and Eder 1994). Hayden's objection to all of the stress models (definable as 'risk reduction') is not shared by Keeley (1995), who warns against the use of selected ethnographic analogies. As an alternative reading of a large body of ethnographic literature, Keeley reflects on the transition to cultivation or the intensification of plant exploitation with suggestions for the determinant variables. These include ecological location (resulting from the prevailing climate), precipitation and population pressure. In his view, "social demand and social complexity are irrelevant" to the process.

An alternative evolutionary perspective is presented by D. Rindos (1984). By adopting a Neo-Darwinian approach, he interpreted the emergence of agriculture and the domestication of plants as a long process of mutualism between humans and plants. The long Palaeolithic involvement of foragers with their immediate environment began with incidental domestication and terminated with a fully developed agricultural system or specialized domestication. Studies that paid attention to foragers' behavior concerning special plants in their environment noticed types of tending activities that often focussed on fruit trees. Such a mutual relationship could, however, have been a basic pattern of behavior amongst all hunter-gatherers, at least since the early Upper Palaeolithic times and maybe even from earlier periods. If specialized domestication had emerged independently in every region in which arable land was available, we should, like Vavilov, expect numerous centers for the emergence of agriculture. Unfortunately, the archaeological evidence does not support this hypothesis. In addition, Rindos mistakenly excluded human intentional involvement in the process (Watson 1995). As studies of peasant societies indicate, decision-making concerning land use, selection of seeds, the time of sowing, etc. are based on past experience and are not a guarantee for success. Intentional cultivation, when it began, did not mean that those who practiced it could predict the evolutionary outcome and the growth of agricultural systems, a point that also undermines the primary assumption of Hayden's (1990; 1995) arguments.

Until now, I have focused primarily on the cultivation of the crop founders (cereals and legumes). As outlined in these works, most current published data shows that animal domestication came second, following the establishment of a more sedentary way of life (with early villages). In western Asia, goat, sheep, cattle and pigs were penned, tended and eventually transformed into the domesticated forms. However, as demonstrated in the papers in this work, one may expect animal domestication to follow various routes, including that of independent domestication, in different regions. As farmers continued to hunt long after the onset of cultivation, it is my opinion that identifying the pristine locations for the emergence of plant domestication should have the research priority. The domestication of animals and the emergence of pastoralism in its various forms, are directly connected with issues of secondary centers, diffusion and migration. I will return to this issue in the concluding remarks.

A new surge of publications focussing on the origins of agriculture and the emergence of herding, began in the late 1980s and has resulted in a continuous stream of new data (this publication included). Better known are the edited volumes (e.g., Manzanilla 1987; Harris and Hillman 1989; Cowan and Watson 1992; Gebauer and Price 1992; Price and Gebauer 1995; Harris 1996, and see references in the papers in this issue), but the more specialized books include *Crops and Man* (Harlan 1992, second edition) which covers the entire world and *The Domestication of Plants in the Old World* (Zohary and Hopff 1994, second edition). These have been followed by a single author book (Smith 1995), a revised edition of which is soon to be released.

For those concerned with the old questions of 'when' and 'where,' the 1980s was a period of information gathering, and although scholars continued to publish additional hypotheses (this review has no intention of being exhaustive), it seemed that in primary areas the main questions had already been answered. The paucity of new

research in China and the slow rate of accumulating evidence in Africa gave the impression that perhaps nothing new would come from the Old World. It now seems, however, that this time was well spent. The results of the archaeo-botanical studies from sites in southwest Asia, for example, have recently begun to force the re-evaluation of several critical notions such as the morphological attributes by which one defines the domesticated species (see Harris [1996] and references therein; Kislev 1992). The time seems ripe, therefore, for another attempt to summarize the archaeological evidence from key areas, test some models and formulate research aims for the next decade. In recruiting the writers for this issue, it seemed appropriate to attempt to update, at least in part, the previous volumes by publishing review articles on focal regions – China (Cohen), South Asia (Meadow), southwest Asia (Harris), Egypt and northeast Africa (Wetterstrom) and sub-Sahara Africa (Marshall). While the first three papers are dedicated to three different regions of Asia, the latter two have a certain overlap. Wetterstrom has essentially dedicated hers to the evidence from plants, and Marshall briefly describes the vegetal food resources, while discussing the faunal evidence. □

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