

Institute of Archaeology UCL  
**Origins of Agriculture: General Introduction and the Near East**  
Dorian Q Fuller

**Background concepts:**

Foraging/hunting/gathering → Cultivation/herding → Domestication

Cultivation: The practice of planting, harvesting and re-planting

Seed crop cultivation: plant re-planting

Herding or Pastoralism: The control of animal herds, including selective culling, protection, and ultimately controlled breeding. Pastoral nomadism: specialized animal based economy, focusing more or less exclusively on animal herding, and mobility

Domestication (biological sense = morphological and genetic changes(s) brought about by human intervention (conscious or unconscious) in plants (as a result of cultivation) or animals (as a result of herding)).

**Childe's 'Neolithic Revolution'**

All of the following elements need not (and probably did not) arise simultaneously

- Change from taking what one could get from external nature to controlling nature: cultivating and herding
- 'self-sufficing' economy
- Food-production allows increased population growth
- Food production 'provides opportunity and a motive for the accumulation of surplus'
- Allowed/ encouraged sedentism, but sedentism and cultivation not necessarily linked
- Preparation and storage of seed crops encouraged (or benefited from) development of pottery:  
    'The new industry has great significance for human thought and for the beginnings of science. Pottery-making is perhaps the earliest conscious utilization by man of a chemical change. ....The constructive character of the potter's craft reacted on human thought. Building up a pot was a supreme instance of creation by man'
- Textile production, cultivation of fibre crops, breeding of sheep for wool
- Tendencies of change in 'magico-religious notions'. New importance of fertility cults linking ancestors with earth from which crops arise.

**Animal Domestication**

**Domestication traits: not all domesticates possess all**

**Change in size.** Shortening of limbs, reduction in size, wider morphological variation. For smaller domesticates (e.g. fowl, rabbits) there was often an increase in size.

**Increased docility/** increased persistence of juvenile traits

**Breakdown of wild-type mating systems,** loss of alpha-male dominance, reduction in sexual dimorphism. Reduction in male horn size, changes in horn shape/size.

**Changes in coloration,** e.g. Pie-bald coloration. Relaxation in selection of natural camouflage

**Changes in fat distribution**

**Changes in hair type and hair cover** (or feathers)

## Plant Domestication

Domestication traits: not all domesticates possess all. These are particularly the case for seed crops. Most do not effect vegetatively propagated crops (including tubers and many fruit vines/ trees). \* = potentially recoverable archaeologically.

Elimination/ reduction of natural seed dispersal  
selected for by cycles of sowing and harvesting  
e.g. non-shattering rachis in cereals \*  
e.g. non-dehiscence of pods in pulses

### Trend towards increasing seed/fruit size

Selected for by open environments, also human selection\*

### Loss of germination inhibition

Selected for by sowing and harvesting  
e.g. thinner seed coats, in pulses, chenopods, \*  
fewer appendages, like glumes or awns

### Synchronous tillering and ripening

Selected by harvesting.  
Also, often shift from perennial to annual.

### More compact growth habit

Selected by harvesting  
**e.g. reduction in branching**  
(e.g. maize, sunflowers)  
**e.g. dense spikes or seed heads**  
**e.g. from climbing habit to self-standing**  
(e.g. pulses)

### Loss of Toxins, bitterness

Human selection, e.g. melons, some pulses, also root crops

Apomixis (production of seeds asexually, with rare cross-fertilization) e.g. blackberries (*Rubus fruticosus* aggregate), some *Citrus* fruits

Asexual Reproduction (vegetative propagation)

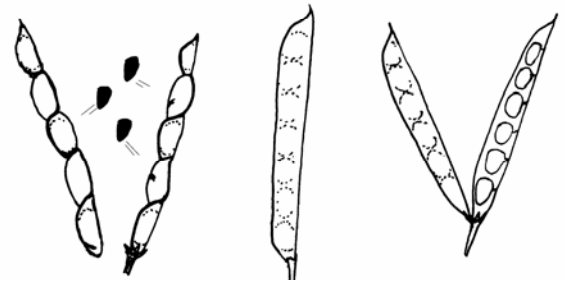
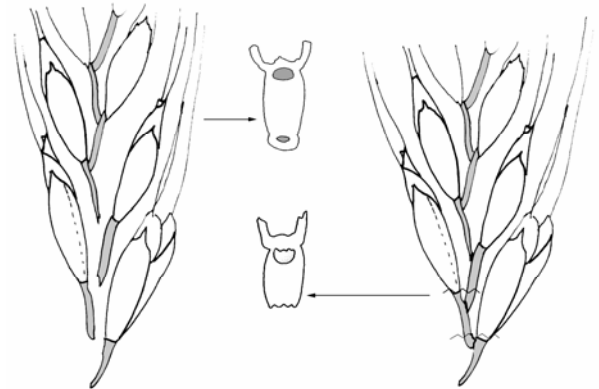
Vegeculture, tubers; Arboriculture, cultivated fruit trees and vines  
(e.g. yams, potatoes, etc; grapes, figs, dates, olives)

Rosaceous fruit trees generally much later, require grafting

## Planting Methods

By seeds → some recombination, selection and evolution over long-term  
→ clear domestication syndromes

By cutting → clones of 'exceptional individuals', some artificial/accidental crosses  
→ single-step selection,



Wild left, domesticated right  
Wheat top  
Bean bottom  
(drawings by DQ Fuller)

## **Research Approaches to the Origins of Agriculture**

### Botany (what, where, how for crops)

Wild progenitors: evolutionary relationship, morphology, genetics

Characteristics of domestication

Inferences about ecological context of domestication, selective pressures

Region of origins: geographical and ecological distribution of progenitors

### Zoology (what, where, how for livestock)

provides equivalent information on animal domesticates

### Quaternary Sciences (where)

Including palynology, and other palaeoenvironmental/ climatic datasets

Reconstruct where wild progenitors are likely to have been in the past

Ecological models of plant/animal resource availability in the past

### Archaeology (where, when)

Locate sites in region of probable origin

Identify technological readiness for agriculture, technological changes with development of agriculture

Examine relationship between sedentism/mobility and agriculture

Bio-Archaeological Evidence (e.g. Archaeobotany)

Provide information of social/ cultural context of domestication

### Archaeobotany (what, when, where, how)

Actual identification of ancient crops, define associated crops

Examination of presence absence of domestication characters

Age: direct AMS dating

Track crops geographically and chronologically

Associated non-crops (weeds) → inferences of early arable ecology

### Archaeozoology

Actual identification of presence of domesticated animals, evidence for domestication process

(evolutionary/ morphological change)

Age (through direct dating or archaeological association)

Track spread of livestock geographically and chronologically

Provides information on herd management, e.g. kill-off patterns

### Osteoarchaeology

Study of human remains for palaeopathology and palaeodemography to examine changes in nutritional status/ disease load of population prior to and after adoption of food production; changes in population structure. Important lines of evidence for evaluating population pressure models of agricultural origins.

## **Domesticates of Southwest Asia**

### Cereals

In general these species are all wild in the transitional zone between grassland steppe and open woodlands of oaks and various woody shrubs.

|               |                     |
|---------------|---------------------|
| Einkorn wheat | Triticum monococcum |
| Emmer wheat   | Triticum diococcum  |
| Barley        | Hordeum vulgare     |
| [Rye          | Secale cereale]     |

note: although Rye is an early crop in the Northern Levant it declines and apparently drops out of use during the course of the Neolithic. European ryes probably a separate domestication

### Pulses and Linseed

In general these species are native to the edges and openings of the oak-rosaceae woodlands and thus overlap somewhat with the cereals.

|              |                          |
|--------------|--------------------------|
| Pea          | Pisum sativum            |
| Lentil       | Lens culinaris           |
| Chickpea     | Cicer arietinum          |
| Grasspea     | Lathyrus sativa          |
| Bitter vetch | Vicia ervilia            |
| Broad bean   | Vicia faba               |
|              | Wild populations unknown |

Linseed/ flax      Linum usitatissimum

Perhaps first cultivated for its edible oily seeds, subsequently varieties were selected for their fibrous stems to make textiles (flax, linen)

Fruits and nuts were probably later domesticates of the Late Neolithic/Chalcolithic  
e.g. Plums, Grapes, Almonds, Melons, olives, figs

### Animals

Goat                      from wild Persian Goat (*Capra aegragus*)  
Native to higher rockier terrain in mountains of fertile crescent

Sheep                    from wild Mouflon (*Ovis orientalis*)  
Native to the lower hills of the fertile crescent

Pig                        *Sus scrofa*

Cattle                    Wild populations native primarily to woodlands throughout the fertile crescent and beyond  
from wild aurochs (*Bos primagenius*)

Aurochs are extinct so their habitat and range is not known, but perhaps from grass and shrubland/woodland.. Populations persisted in the forests of Eastern Europe until the medieval period, but other populations of Aurochs in the early Holocene were known to have survived in Savanna conditions of the Sahara and the woodland-steppe conditions of Pakistan, perhaps also in Indian Savannas.

Key issues surround the ordering of:

Broad spectrum plant use, sedentism, population growth, territoriality, resource stress (due to environmental change), cultivation, plant domestication, herding, animal domestication, changing symbolic relationships between genders and with ancestors.

Which transitions were intentional and which were unforeseen consequences?

Generalized Chronology of Agricultural Origins in Southwest Asia

D.Q. Fuller 28.x.2001

| C-14 age | Calendar Age               | Greece                                 | Central Anatolia | Cyprus  | Coastal Levant   | Southern Levant   | Middle Euphrates (Syria)                                  | Eastern Taurus  | Zagros Mtns                      | Central Asia                  | Pakistan              |
|----------|----------------------------|--|------------------|---|--|---|---|---|----------------------------------|-------------------------------|-----------------------|
| 7Kbp     | 6000 BC                    | Early Neolithic                        | Hacilar          |   | Lustrous Pottery Cultures<br>Ras Shamra VA-B, Amiq A-b, Byblos | Late Neolithic (Pottery Neolithic A)<br>Jericho IX                                      | Abu Hureyra 2C, Damishliya                                | Cafer Hoyuk<br>Pottery Neolithic                          | Late Neolithic (Hassuna/Susiana) | Jelitin II<br>Jelitin I       | Aceramic Mehargarh IA |
| 8Kbp     | 7000 BC                    | Aceramic Neolithic<br>Knossos, Franchi | Catal Hoyuk      | Khirkitia   | L. PPNB  | PPNC  | Final PPNB  |   | Late Aceramic Neolithic Jarmo    | Pre-Jelitin<br>Sang-i-Chakmak |                       |
| 9Kbp     | 8000 BC                    | Mesolithic                             | Asikli Culture   | Kalavassos-Tenta  | Ras Shamra VC  | Late Pre-Pottery Neolithic B<br>Abu Gosh, Goraife II                                    | Late PPNB   | Cafer Hoyuk   | Alli Kosh                        |                               |                       |
|          | 9000 BC                    |  |                  | Paraklitha<br>Shillourokambos<br>Kissomeria<br>Mylouthkia |  | Middle Pre-Pottery Neolithic B<br>Tell Aswad 2, Goraife I                               | Abu Hureyra 2B, Halula, Tell Assouad                      | Taurus PPNB<br>Cafer Hoyuk V-XII<br>Cayonu: Pig Husbandry | Bus Mordah<br>Ganj Dareh E       |                               |                       |
| 10Kbp    | 10,000 BC                  |  |                  | ?   |  | Early Pre-Pottery Neolithic B<br>Tell Aswad 1B, Jericho                                 | Abu Hureyra 2A  | Taurus PPNB<br>Cafer Hoyuk V-XII<br>Cayonu: Pig Husbandry |                                  |                               |                       |
|          | 11,000 BC<br>Younger Dryas |  |                  |   |  | Pre-Pottery Neolithic A<br>Jericho<br>Tell Aswad 1A, Netiv Hagdud                       | Mureybet III, Jerf el Ahmar<br>Abu Hureyra 'Intermediate' | Taurus PPNB<br>Cayonu Round Building<br>Pig-hunting       |                                  |                               |                       |
|          | 12,000 BC                  | Upper Palaeolithic                     |                  |   |  | Khiamian<br>Sables de Beyrouth  | Mureybet IB-II  | Hallam Cemi<br>Pig-husbandry??                            |                                  |                               |                       |
|          |                            |  |                  |   |  | Harifian<br>el-Natufian   |   |   | Zawi Chemi<br>Shanidar           |                               |                       |
|          |                            |  |                  |   |  | Natufian<br>Sables de Beyrouth<br>Saayideh  | Abu Hureyra IC, Mureybet IA<br>Abu Hureyra IB             |   |                                  |                               |                       |
|          |                            |  |                  |   |  | Early Natufian<br>Eynan, El Wad, Hayonim<br>Wadi Hammah 27, Jericho,<br>Mallaha, Beidha | Abu Hureyra IA  |   |                                  |                               |                       |
|          |                            |  |                  |   |  | Geometric Kebaran<br>Nahal Oren VII, Mushabi  |   |   |                                  |                               |                       |
|          |                            |  |                  |   |  | Late Kebaran  |   |   |                                  |                               |                       |

**Key subsistence transitions:**

- Horizon of cultivation (morphologically wild)
- ===== Horizon of domesticated plants
- ===== Horizon of domesticated animals and plants

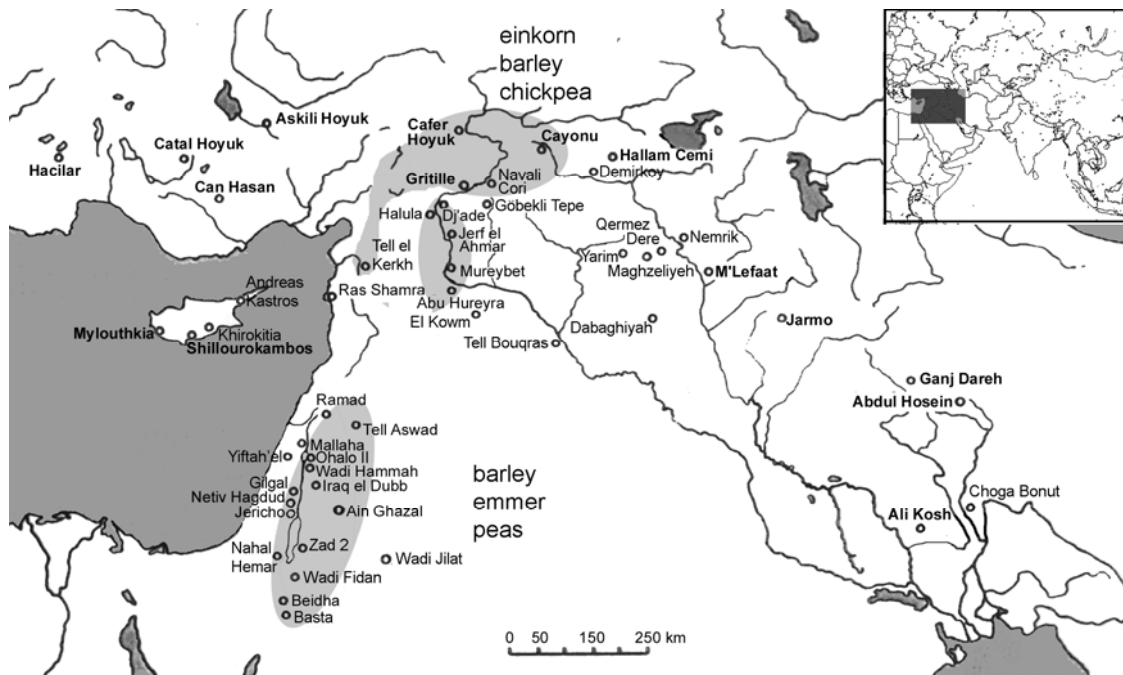


Figure 3. Map of Southwest Asia, indicating selected sites that provide evidence for the origins of agriculture, including wild plant cultivation, cultivation of domesticated plants, and the integration of domesticated animals. Regions indicated in grey are probable distinct plant domestication centres based in part on different species or lineages of the Southwest Asian cereals.