Expanding Neolithic Worlds

1

Radiocarbon dating of the earliest Neolithic in Europe

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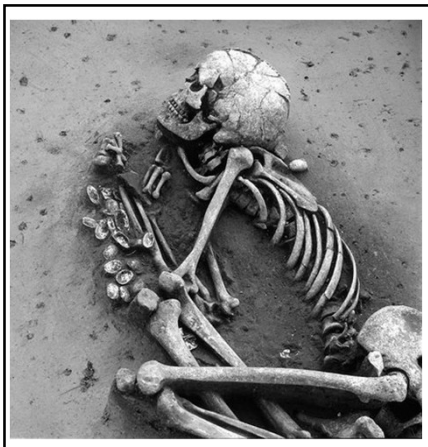

A skeleton buried by a Middle Neolithic culture found near Saxony-Anhalt, Germany.
A review of DNA from skeletons across Europe indicates that today's Europeans are descended from three groups who moved there at different stages of history.

3

3 waves

- Modern Humans
- First farmers
- Yamnaya pastoralists

- Studies indicate that today's Europeans descend from three groups who moved into Europe at different stages of history.
- The first were hunter-gatherers who arrived some 45,000 years ago in Europe.
- Then came farmers who arrived from the Near East about 8,000 years ago.
- Finally, a group of nomadic sheepherders from western Russia called the Yamnaya arrived about 4,500 years ago.

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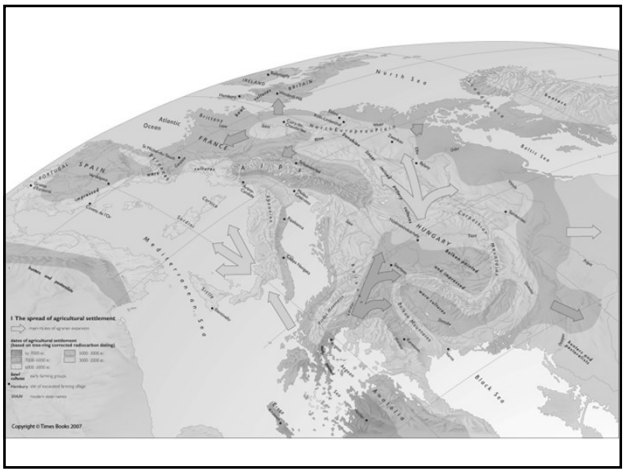

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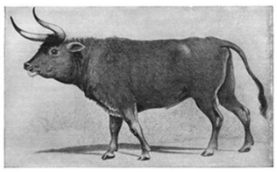

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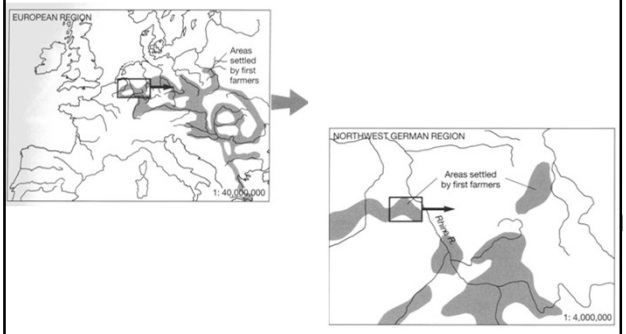
Scales of spatial analysis



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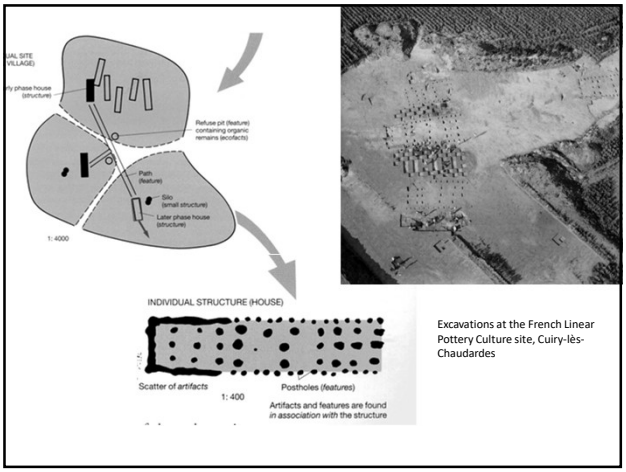

Excavations at the French Linear Pottery Culture site, Cuiry-lès-Chaudardes

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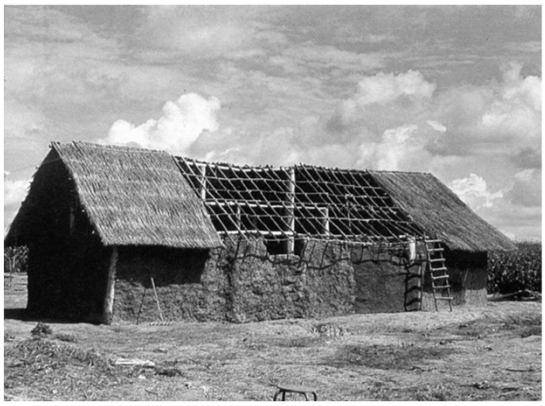

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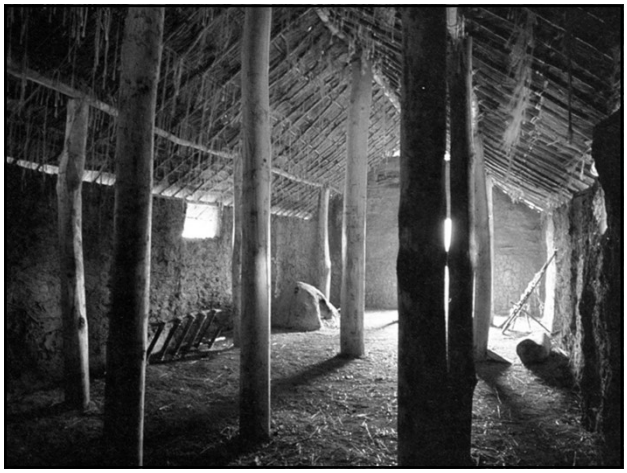

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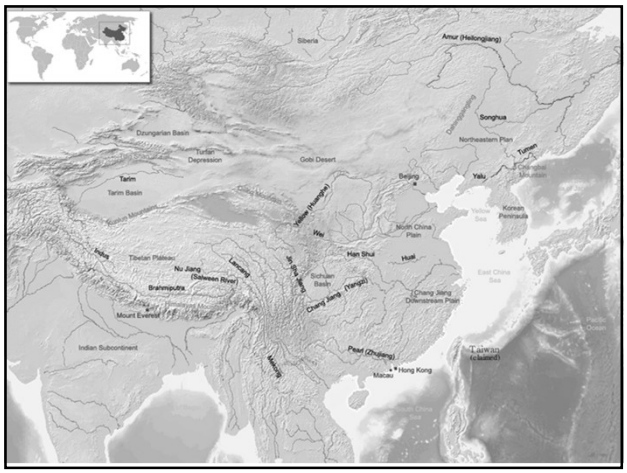

Siberia
Amur (Heilongjiang)
Songhua
Northeastern Plain
Dzungarian Basin
Turpan Depression
Gobi Desert
Tarim
Tarim Basin
Beijing
Yalu
Korean Peninsula
Yellow Sea
Yellow (Huanghe)
Wei
North China Plain
Han Shui
Huai
East China Sea
Tibetan Plateau
Indus
Nu Jiang (Salween River)
Lancang
Brahmaputra
Mount Everest
Sichuan Basin
Chang Jiang (Yangzi)
Chang Jiang Delta
Indian Subcontinent
Pearl (Zhujiang)
Hong Kong
Macau
Taiwan
Pacific Ocean

12

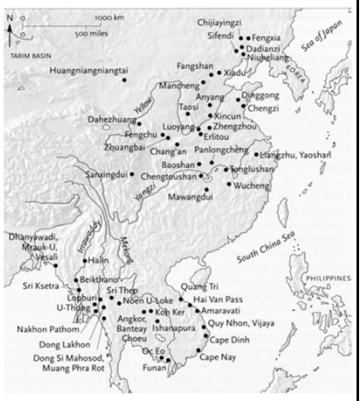
Domestication in East Asia

- Rice was domesticated along the Yangtze and Huai River Valleys, China by 9000 B.P.
- Millet was domesticated in the Yellow River Valley, China by the Peiligang culture, c. 8000 B.P.
- Dogs, pigs, and water buffalo were domesticated in southern China
- Pigs and, possibly, chickens were domesticated in northern China

Pottery vessels from Banpo Village site, China.

13

- In the 8th – 7th millennia BC, farming communities were established in the valleys of the Yellow River, where millet was cultivated, and the Yangzi river, where rice was grown.
- Increasing social complexity followed, and by the 3rd MBC there were large, defended centers associated with elite cemeteries. These were to become East Asia's earliest states.



14

The origin of rice cultivation

Rice is essentially a marsh plant; it depends as much on nourishment from the water as on the fertility of soil.

15

Given enough water rice can be planted on quite marginal soils and, with terraces, on rough terrain.

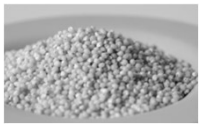
16

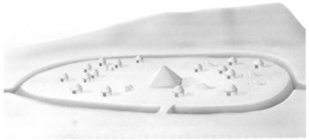
- The transition from gathering wild rice to cultivating domesticated rice took place in the Yangzi River region of S. China by 7000 BC.

The Hemudu site, south of Shanghai, 5000-4500 BC, provides extensive evidence of rice cultivation. The site is remarkably well preserved.

17

- In the Yellow River, millet became the staple domesticated crop.





Banbo, near Xian, a Yangshao culture village, 4th MBC. The settlement was defended by a deep ditch; circular houses are well-spaced; cemetery lies beyond the ditch.

18

- Longshan Phase,
  - 2700-2000 BC
  - Intensive rice farming
  - Rammed-earth
  - Social differentiation




19

New world agriculture

Mesoamerica and North America

20

In ancient Mesoamerica, maize (corn) was not only the basic food, but also a plant of enormous ideological and spiritual significance

Maize God, Temple 22
Copan, Honduras, 680-750, volcanic tuff
Courtesy of The Trustees of the British Museum

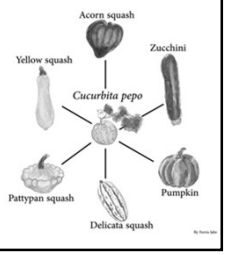
- Mesoamerican cosmology sometimes imagined the earth as a big maize field, and the gods were widely believed to have made humans partly from maize.
- Rituals of sacrifice and renewal imitated the lifecycle of maize.

21

Mesoamerican Domestication

Squash (*Curcurbita pepo*) was the earliest plant domesticated in Mesoamerica

- Earliest squash seeds dated to 10,000-8300 B.P.
- Ancestor of squashes eaten today including pumpkins, acorn squash, zucchini, spaghetti squash, etc.

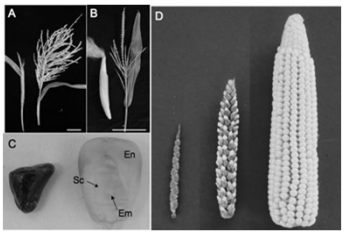


22

Maize was domesticated from teosinte, a wild grass found in the highlands of Mexico

- Earliest maize dated to 6250 and 5500 B.P.

Teosinte versus maize. (A-B) The female (left) and male (flowers) of teosinte (A) and maize (B). (C) Teosinte kernel (left) and maize kernel (right). (D) A comparison of teosinte on the left, maize on the right and the F1 of maize and teosinte in the middle.

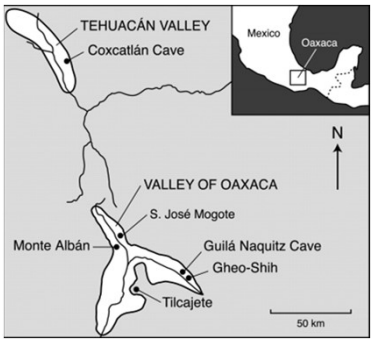


23

Beans were domesticated independently in Mesoamerica and in the Andes

- Earliest date for a Mexican bean is 2500 B.P.
- It is very likely that beans were domesticated earlier, at the same time as maize

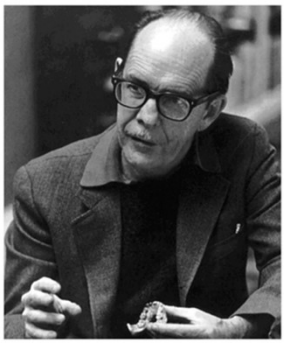
24



Maize was domesticated from its wild ancestor, Teosinte, by 4300 BC in SW Mexico.

Marcus J , Flannery K V PNAS 2004;101:18257-18261

25



Richard A. MacNeish

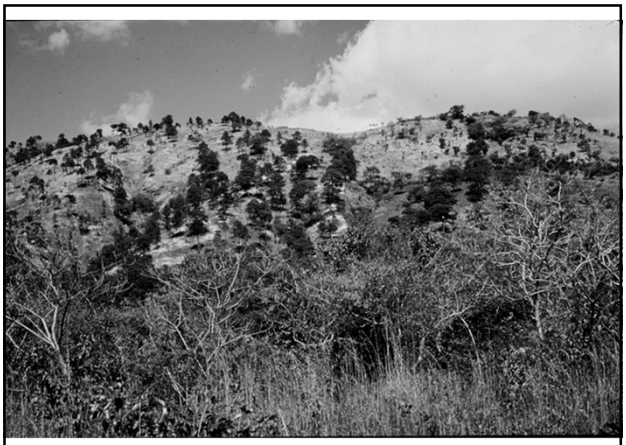
Kent V. Flannery

26

Excavations at Guilá Naquitz

Excavations at Coxcatlán

27



28

- Squash (several varieties) and bottle gourds were the first plants to be domesticated by Archaic period people in Mesoamerica.
- Bottle gourds and wild squashes have hard rinds and bitter flesh. However, the seeds of squash are edible and nutritious.

29

Squash seed from Zone C at Guilá Naquitz

Perry L , Flannery K V PNAS 2007;104:11905-11909

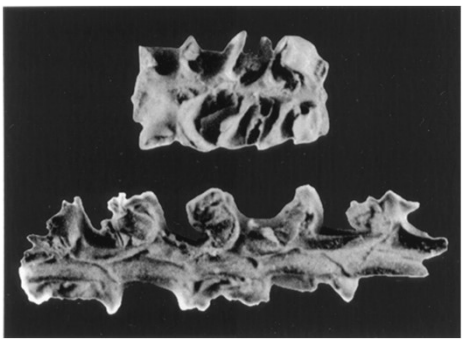
Desiccated specimens of chili peppers from Guilá Naquitz and Silvia's Cave.

30

Teosinte is a Mesoamerican cereal grass that grows in the wild. It has small grains and looks nothing like maize.

31

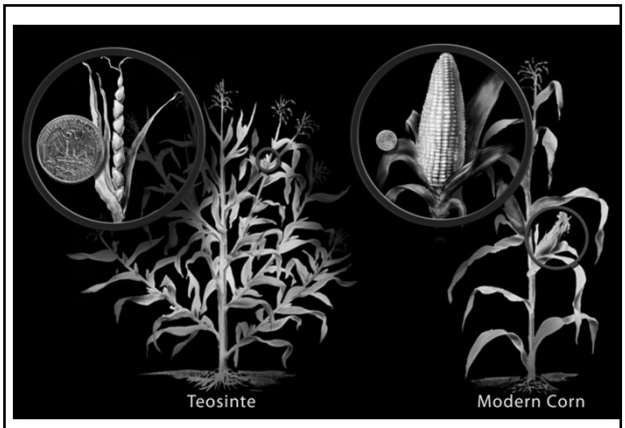
The two oldest maize cobs in the New World from Guilá Naquitz Cave.



Piperno D R , Flannery K V PNAS 2001;98:2101-2103

Bottom specimen length = 2.5 cm

32



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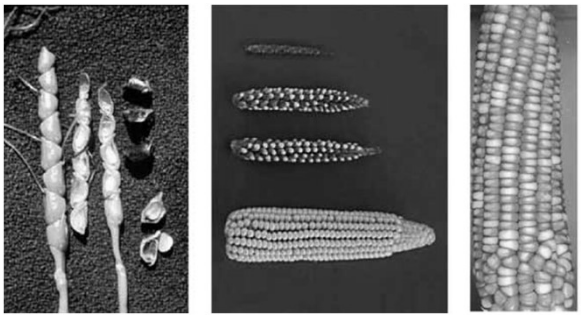
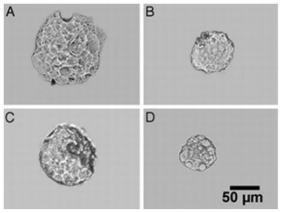


Left: Teosinte
Center: Some possible intermediary types of maize
Right: Modern domesticated maize

34

Microfossil evidence

- Phytoliths (microscopic silica bodies that form in plants) like these and starch grains recovered from the surfaces of grindstones show that maize was domesticated by 6700 BCE (earlier than the earliest maize cobs recovered).

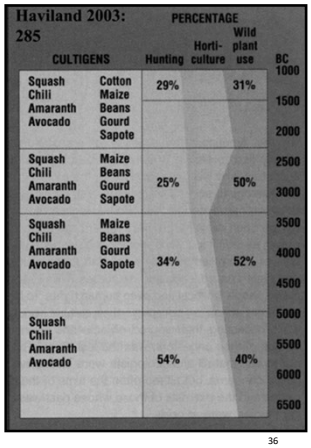


35

The move towards domestic food production is closely tied to sedentism, human population growth, & emerging socio-political complexity.

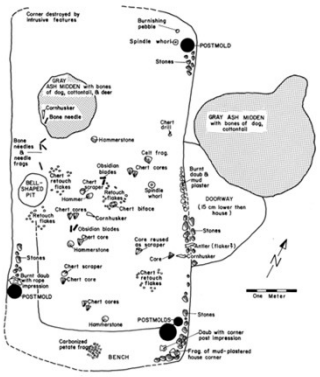
Fully domesticated economies did not develop straight away. In Mesoamerica we see that people continued to hunt and gather well after horticulture began there.

Relying upon wild foods to supplement planted food was due in part to the lack of domesticated animals to provide a good source of protein.



36

Eventually, sedentary villages

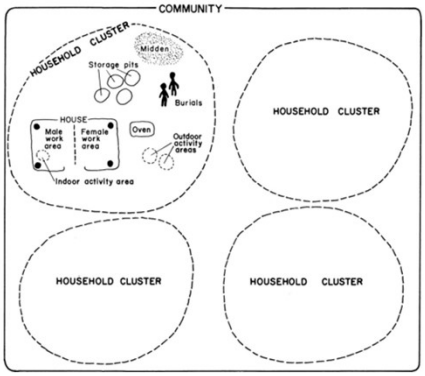


Plan view of a Formative Period house in Oaxaca, Mexico

Cross section of a Oaxacan house and associated bell-shaped pits

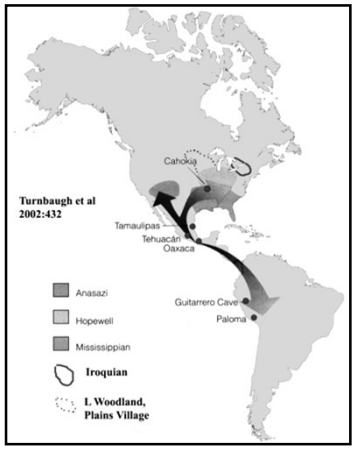
37

Community level spatial patterning



38

Maize, beans and other plants were domesticated in Mexico. Over the next several thousand years, they diffused widely throughout the Americas.



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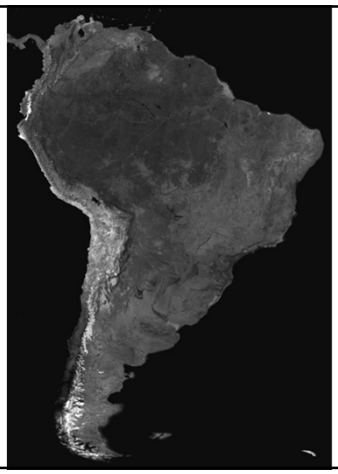

South America's prehistory is extraordinarily rich.

Archaeologically, the best known parts of the continent are (a) the Andes and the Pacific desert coast and (b) Amazonia and the Atlantic coast.

40

The Andes Environment

Andes are the second highest mountain chain in the world

- The Andean highlands are divided into four zones based on altitude above sea level:

1. Quechua zone: 2300-3500 m, where corn grows well
2. Suni zone: 3500-4000 m, where crops indigenous to the Andes are grown
3. Puna zone: 4000-4800 m, open grassland for grazing alpacas and llamas
4. Cordillera zone: above 4800 m, not used for agriculture

41

Andean Domestication

- Domesticated beans from Guitarrero Cave have been directly dated to 4300 B.P.
- Quinoa seeds have been found in layers 5700-4500 years old at Panaulauca Cave
- The earliest evidence for domesticated potatoes dates to 8000 B.P.

42

Andean Domestication

- Domesticated beans from Guitarrero Cave have been directly dated to 4300 B.P.
- Quinoa seeds have been found in layers 5700-4500 years old at Panaulauca Cave
- The earliest evidence for domesticated potatoes dates to 4000-3000 B.P.
  - Probably not the earliest domesticated potatoes because they were found along the coast, not where wild potatoes grow
- Llamas and alpacas (camelids) were domesticated beginning 10,000-5000 years ago
- The other domesticated Andean animal is the guinea pig, when domesticated unknown, but perhaps after camelids

43

Preagricultural Coastal Villages

By 8000 B.P. small settled villages developed along the Peruvian coast

- Houses were built of reeds and grasses over a wooden structure
- About 10 families lived in a village at any given time
- Burial data indicates that there were not higher status individuals

Inhabitants of these villages were hunter-gatherers who relied heavily on the rich coastal marine resources

- A wide range of wild plant resources including seeds, fruits, and tubers were exploited
- Cultivated gourds were domesticated; beans and squash may have been cultivated, but they were not significant parts of the diet

44

45

The Cotton Preceramic

This period is named for the prevalence of cotton seeds and absence of pottery on its sites

- These sites are often quite large and contain evidence of monumental architecture
  - The flat-topped pyramid, Huaca de los Idolos, dates to 5500-4500 B.P., the earliest known monumental architecture in the New World

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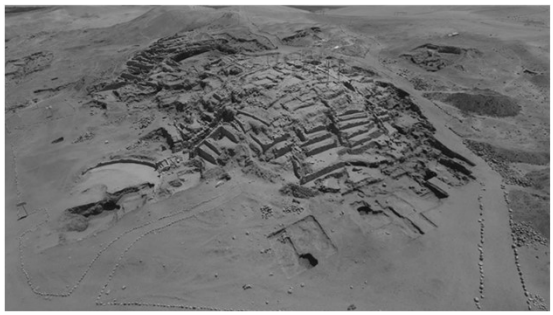
Huaca de los Idolos



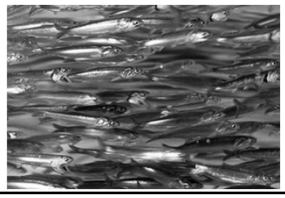
47

The Cotton Preceramic

- The bulk of the Cotton Preceramic diet consisted of fish and shellfish
  - However, a wide range of domesticated plants including gourds, squash, chili pepper, beans, and jicima were grown
- The dominant crop species was cotton, used for making textiles and nets

48

Anchovies schooling off the Pacific coast



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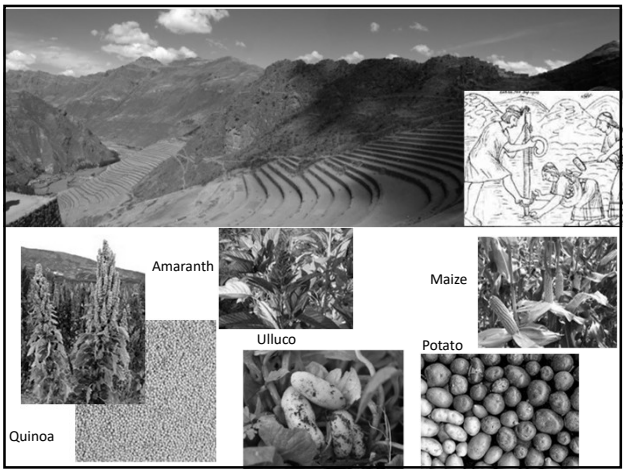


50

Eastern North American Domesticates

Late Archaic peoples of eastern North America independently domesticated a variety of plants
- Including sunflower, marsh elder, chenopod, and squash

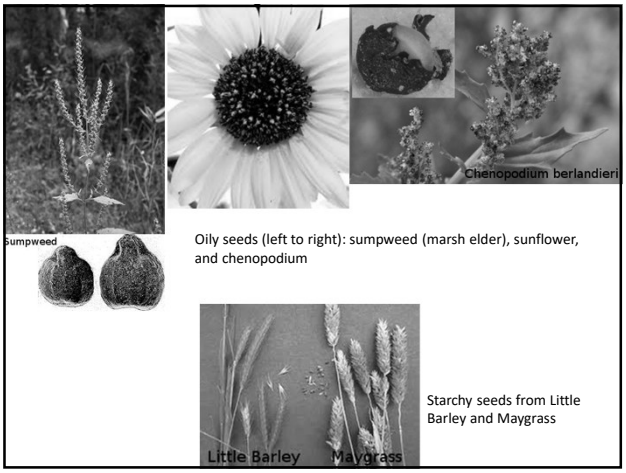
- Late Archaic peoples also narrowed their subsistence base—especially in areas with rich supplies of shellfish
  - Shell middens are sites built of discarded shells
- The impact of domesticates on subsistence in the Late Archaic was minimal
  - Hunting and gathering continued to be the basis of Late Archaic subsistence

51

A layer of shells exposed by excavation

Eroded and exposed shells on the surface of Mound A, Crystal River Archaeological State Park, Florida.

52



Oily seeds (left to right): sumpweed (marsh elder), sunflower, and chenopodium

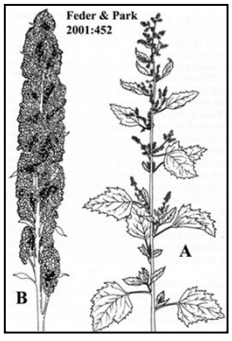
Starchy seeds from Little Barley and Maygrass

Little Barley Maygrass

53

Living year-round in one place with an increasingly large group of disparate people is challenging:

- Finding enough food to feed entire community.
- Collecting & storing food surplus during seasons of plenty in preparation for seasons of scarcity.
- With large food surplus, the population is unable to migrate without abandoning the food supply.
- Ensuring equitable redistribution of food to multi-family village.
- Addressing tensions and disputes between individuals & families.
- Dealing with raiders & thieves who want to appropriate the village's food and other resources.
- Gaining access to needed resources found outside of homeland.



A Wild Lamb's Quarter (aka Goosefoot; *Chenopodium album*) versus B the domesticated version. The latter was bred to produce larger seeds in dense clusters in order to maximize yield. Such changes reduce natural seed dispersal abilities.

54

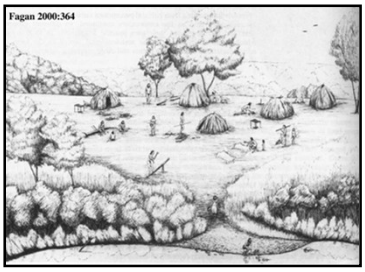
The earliest of villages were likely seasonally occupied when (& where) scarce resources (food) were seasonally concentrated.

With horticulture, the villagers might be able to build up preserved food surpluses. Food caches 'anchored' the group in one place.

Sedentism in strategic places encouraged population growth.

As other groups might want access to the same places, it became important to assert and validate 'ownership' rights.

One such method to demonstrate 'right of prior claim' was by conspicuously burying one's ancestors near the village…



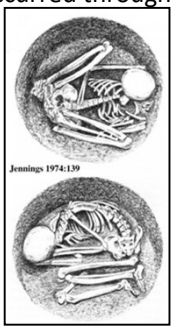
Early villages consisted of several related families who routinely lived and worked together.

55

Social transformation gradually occurred through a series of stages:

1) Small horticultural villages

- Sedentary population (a few 100s), often with a horticultural economy but many with continued reliance on hunting and gathering.
- Egalitarian social system with 'achieved' status (lifetime accomplishments define individuals' prestige).
- Few 'specialists', and only sexual division of labour.
- Multi-family village politically integrated through real or imaginary common ancestor, run by 'councils' or 'secret societies' with each family having initiated members (Sodalities).
- Each village was independent and represents the highest level of political integration.



'Indian Knoll' Archaic burials, Eastern USA. Burials among egalitarian societies generally contain only work-related objects associated with achieved status of adults during their lifetime.

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2) Several villages grouped into Chiefdoms

- Leaders emerge because they play important political and religious roles. They also mediate disputes between autonomous families and coordinate communal labour.
- Leaders are essential to control & organize diverse populations within towns and villages.
- Leaders claim descent from prestigious or supernatural ancestors (beginnings of inherited status since their children can make same claim).
- Status inequality symbolized by 'status goods'. Leaders also differentiated from followers in burials.
- More formalized trade and exchange between villages. Sometimes long-distance trade of exotic goods.
- Social ranking is a continuum- there are not big social gulfs between the ranks.
- Competition between powerful Chiefs, often for scarce resources, leads to inter-village warfare. Inter-village alliances also brokered, often through marriage.
- Conflict can lead to victorious Chief removing rival, & assuming control of defeated village.

Early leaders were often people of spiritual power such as this shaman who was buried with his mask consisting of a wolf upper jaw.

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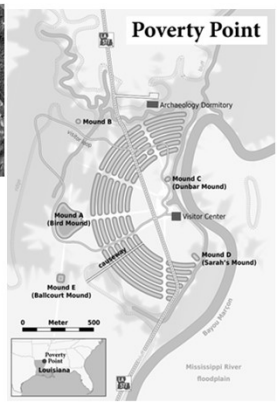
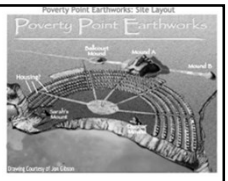
Large quantities of stone were brought to the site from great distances (70 metric tons of chert, crystal quartz, slate from sources up tp 700 km distant)





The Late Archaic period site of Poverty Point, LA, consists of massive earthworks, evident planning. There are six concentric rings, 2 m high and 20 m wide, enclosing a semi-circle 1 km in diameter.
Within the embankments we see mounds (bird-shaped?)
Domestic refuse suggests that some habitation took place, but there are no surviving dwelling structures.
What kind of social organization is reflected here?

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No easy answers. Consider:

- Settled villages appear **before** agriculture in Middle East, Africa and the Andean coast.
- Settled villages appear **after** agriculture in New Guinea, the Andean highlands, and Mesoamerica.
- Pottery developed **early** in some places – Africa, China – **late** in other places – Middle East, New Guinea, the Andes, and Mesoamerica.
- Plants domesticated **before** animals: Middle East, New Guinea.
- Plants domesticated **after** animals: Africa, the Andes
- Plants domesticated at the **same time** as animals: China
- Domesticated animals play little role at all: Mesoamerica

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A complex process

- The process involves changes in
  - the biology of plants and animals
  - human social organization
  - how people conceive of their world

Variables include
- Plant and animal species involved
- Local environment's characteristics
- Particular cultural practices

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