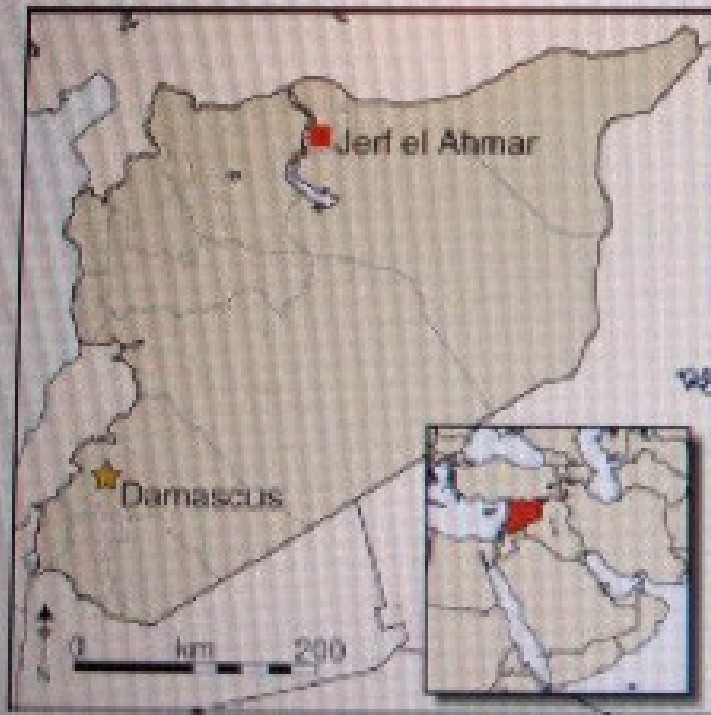


Large-scale cereal processing before domestication during the tenth millennium cal BC in northern Syria

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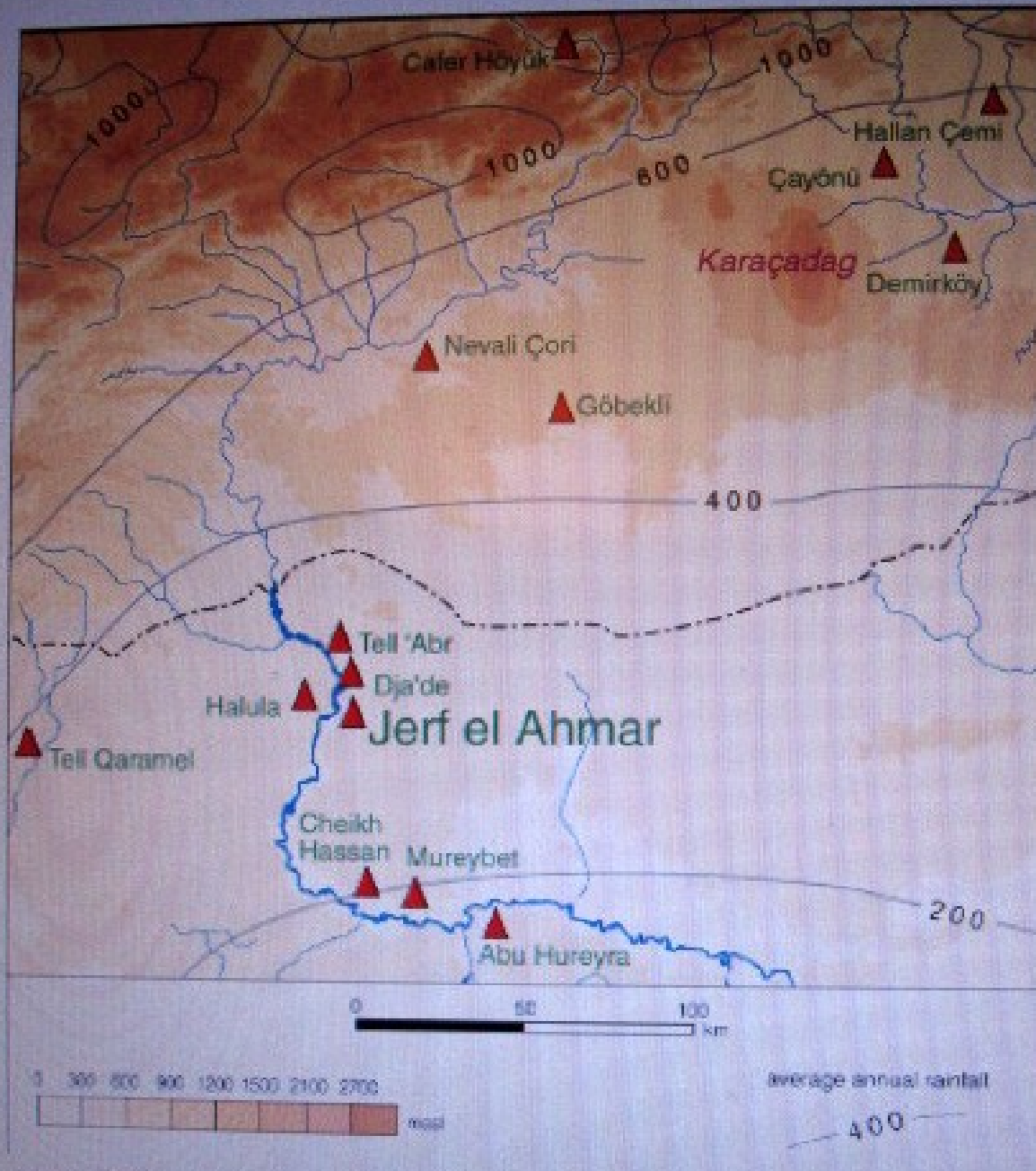


At Jerf el Ahmar in northern Syria the authors have excavated a settlement where the occupants were harvesting and processing barley 1000 years in advance of its domestication. Rows of querns installed in square stone and daub buildings leave no doubt that this was a community dedicated to the systematic production of food from wild cereals. Given the plausible suggestion that barley was being cultivated, the site opens a window onto a long period of pre-domestic agriculture. Rye was also harvested, its chaff used to temper mud walls.

Keywords: Levant, Syria, agriculture, barley, querns

JERF EL-AHMAR

- PPNA site on Middle Euphrates
- 9500-9000 cal BC
- 5 similar PPNA sites on Euphrates: Mureybet, Tell Abr, Dj'ade, Cheikh Hasan
- All have evidence of cereal use 1000 years before domestication



PPNA sites

Figure 1. The location of the principal sites mentioned in the text, average annual rainfall and relief.

Botanical Evidence

- From 3 of the sites, >70,000 identified charred plant parts
- 120 taxa represented
- Plants are wild, including barley and rye
- Over time, proportion of cultivars increases relative to wild
- Cultivation inferred from size of grains, types of weeds, scale of activity

Processing Installations

- >400 querns found, mostly in secondary contexts such as wall foundations
- 30 querns in situ on house floors
- Of 11 houses, 9 have multiple querns
- Querns set in bases of stone and mud
- Quern rooms are too small to have been used for other activities

Room 10

- Partly burned so better preserved
- Seed cakes on one quern, possibly of mustard or rape seed, for oil?
- Other seed cakes of well-ground material and not identified
- Large stone disks possibly for baking
- Limestone vats may have held liquid
- Possibly for brewing barley beer

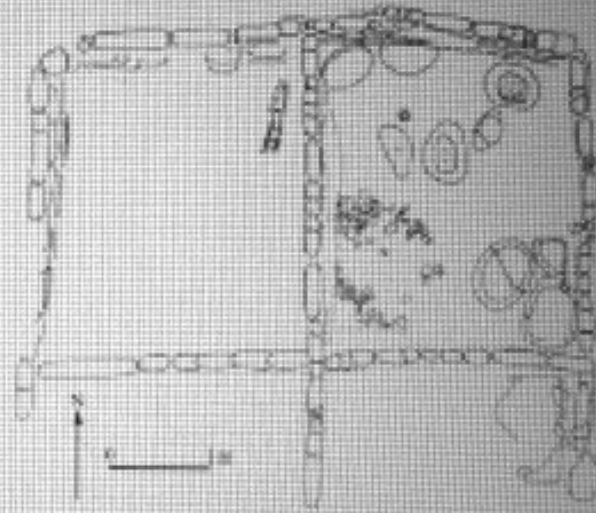
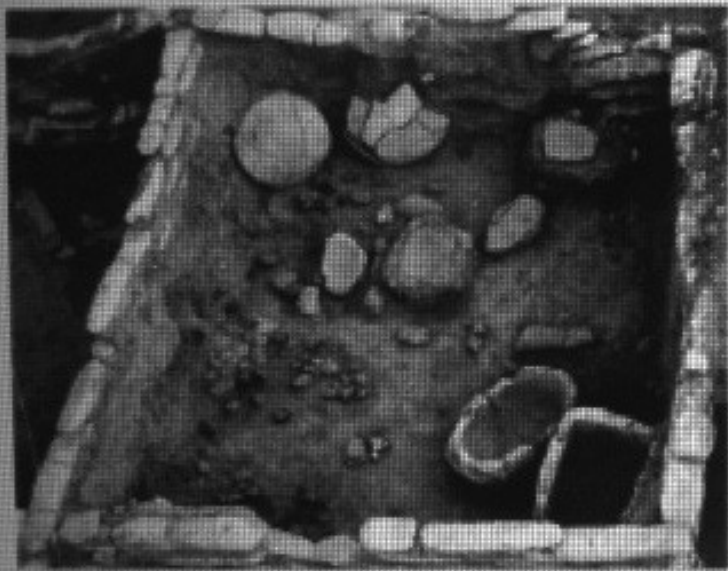


Figure 7. House 10, which was destroyed by fire and contained a rich array of food processing objects and charred plant remains in situ. Four querns are aligned diagonally (for further explanation see text).

Houses with querns On the floor

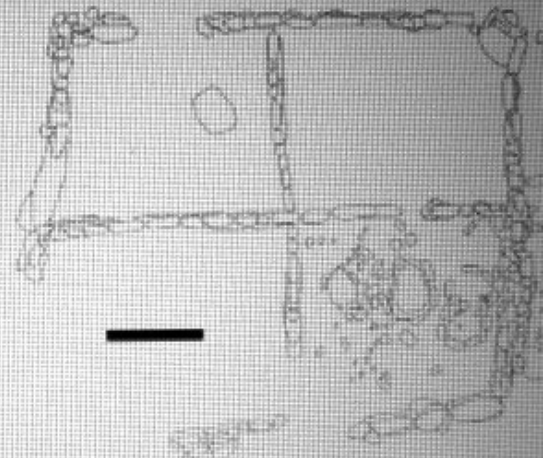


Figure 6. House 54 consisted of four rooms, one of which contained a processing installation of three aligned querns in confined space.

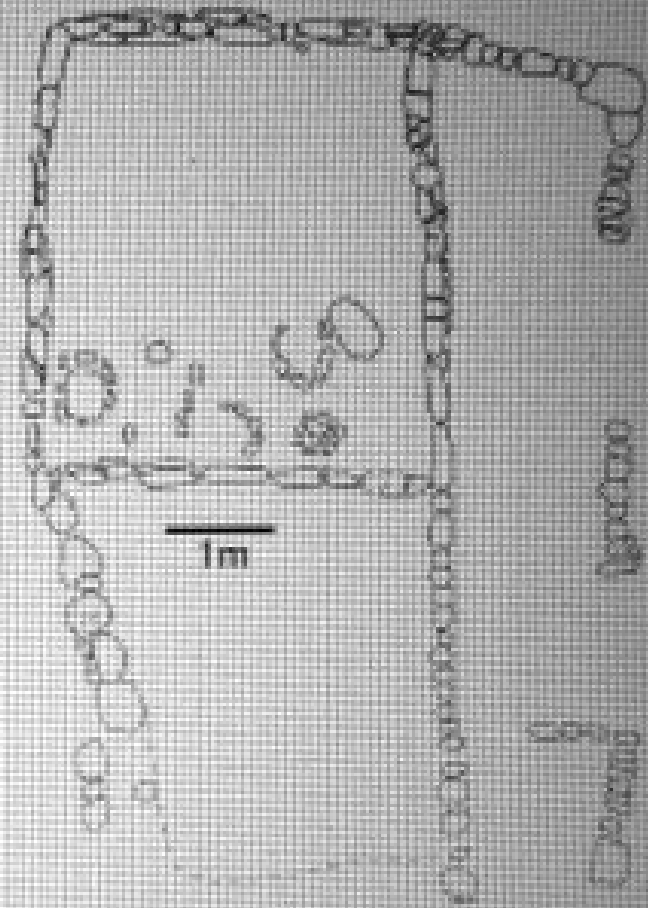
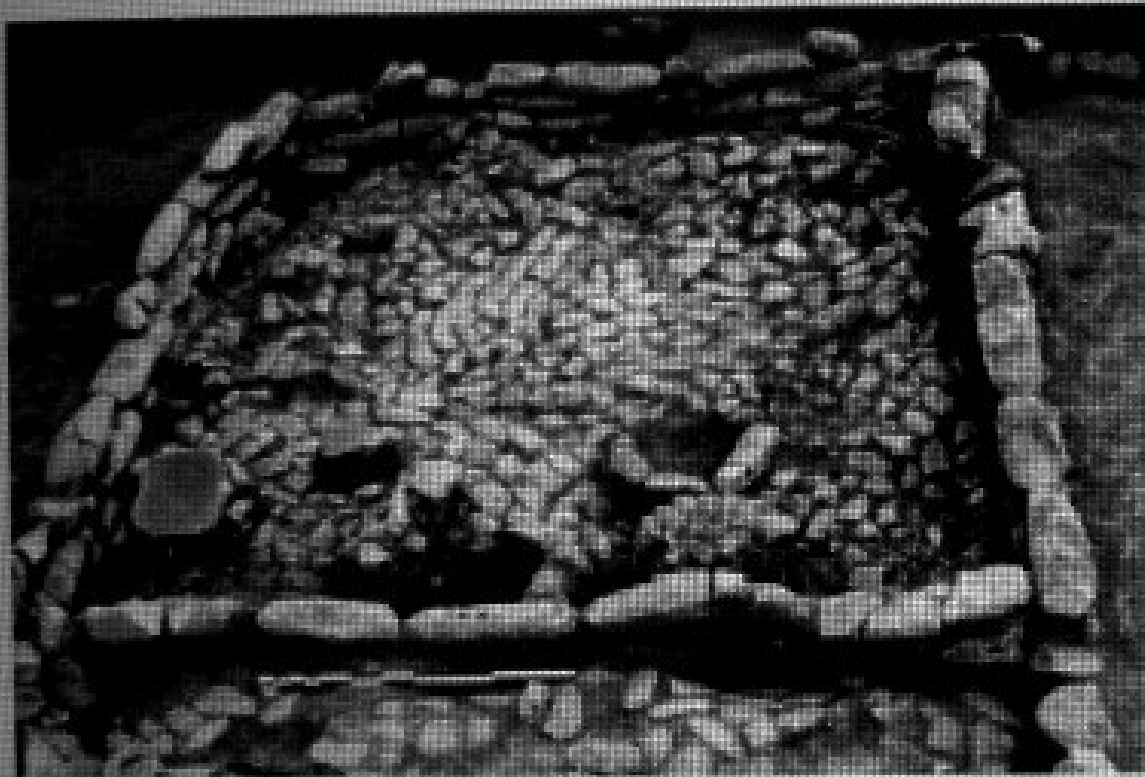
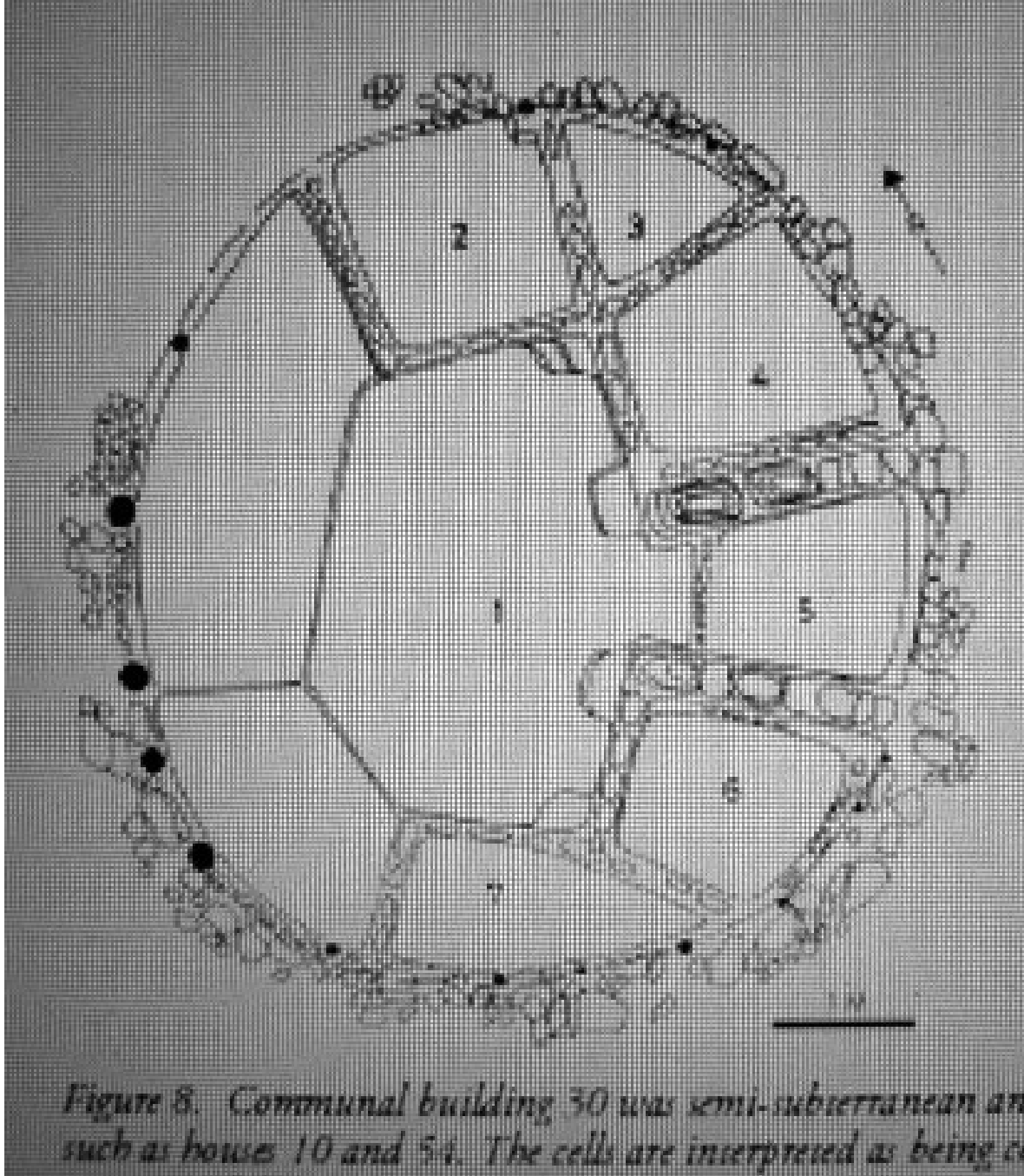


Figure 5. House 23 consisted of two rooms, one contained an installation of three querns.

Jerf el Ahmar House 23 with querns on floor

Storage Facilities

- Large “communal” building divided into cells that may have been grain bins
- Cells may have held 3m^3 , which is 2000 kg
- If person eats 200 g/day, one bin would feed 30 people for one year
- Processed barley and rye separately
- Chaff may have been stored



Communal building
Storage structure
at Jerf el Ahmar

Figure 8. Communal building 30 was semi-subterranean and such as houses 10 and 54. The cells are interpreted as being co

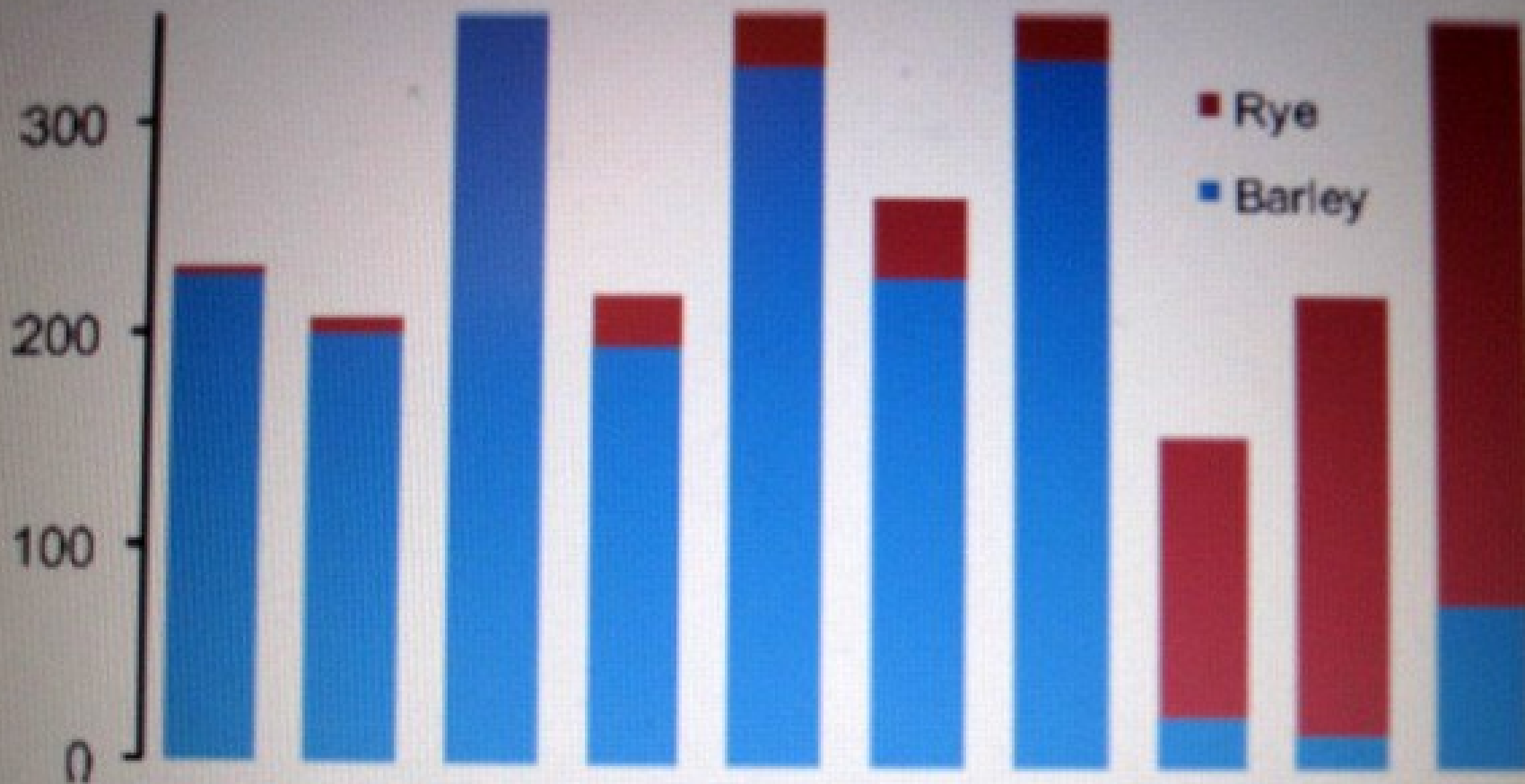


Figure 9. The y-axis gives absolute numbers of grains identified, bars indicate the proportions of barley (blue) and rye (red) found in 10 samples from Jerf el Ahmar. The proportions indicate that either barley or rye is dominant, suggesting that these two crops were processed separately.

Evidence for separate processing barley and rye

Other Features

- Sickles
- Two species of mice, both grain eaters
- Hunted aurochs, gazelle, equid

A Window on the Transition

- Time trends over 500 years:
 - Circular to rectangular houses
 - Sickles are better made
 - Storage facilities later
 - Querns grouped for specialist labor
 - Communal building later
 - Shift toward greater proportion of cultivars

Implications

- Large scale cultivation
- Requires labor for field preparation, sowing, weeding, protection, harvest, thresh and process
- Collective organization
- Implies social hierarchy?