VILLAGE ON THE EUPHRATES

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OXFORD
UNIVERSITY PRESS

2000

orbitalia were present in two cases. Neither dental caries nor abscesses were recorded.

The skeletal material from phase 7 was recovered from the area of the main house that had been rebuilt. A male (73.1316) was associated with an arrowhead but no injuries to the bones were noted. There were more males in this group than usual, and several, for example, 73.1315A, had modifications of the metatarsals associated with kneeling. One juvenile (B51) had a septate humerus, which recalls those of the previous phase.

Skeletal material from phase 8 was very fragmented, and most was recovered from the sieves; none could be attributed to the fill of the large pits that often contained burnt animal bone. Only one human bone, a tibia (B101), was charred. Adults and juveniles of all ages were represented.

Enamel pearls and a Carabelli's cusp on molars of one youth (73.810) provided evidence of a possible link with individuals from earlier levels in other trenches. Squatting facets on the tibia of three individuals (B25, B35, B101) indicate that squatting was the habitual posture. Unfortunately, we could not establish from the remains whether the saddle quern continued to be used extensively for preparing grain, although one adult (73.B86) had a buttressed femur. Wear on the teeth appeared to be less severe, and it is possible that people were eating cooked food more often.

Females, males, and numerous children were buried in the area of Trench E during phase 9 in historic times. Arthritic changes and degenerative joint disease were common among the adults. Periosteal new bone growth on a juvenile femur and severe osteitis of the skull of an infant (73.95) indicated the presence of infective disease. Three individuals had noticeably thickened skull bones that could be indicative of hemolytic condition or malaria.

Trench G

Fragments of the skull of a juvenile (73.3066) were recovered from the occupation debris next to a mudbrick structure in phase 1. The dental age assessed from the stage of development of the permanent dentition was about 9.5 years; the deciduous dentition appeared to be delayed—a characteristic noted elsewhere in the material.

Appendix 6: Analysis of Charcoal from Abu Hureyra 1

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We analyzed 3,118 fragments of charcoal dispersed through 15 levels in the Abu Hureyra 1 deposits. Most of the charcoal probably came from multiple firings of hearths over an extended period. The inhabitants of Abu Hureyra 1 collected fuel for their fires nearby, so the charcoal represents species of trees and shrubs that would have been present in the local vegetation.

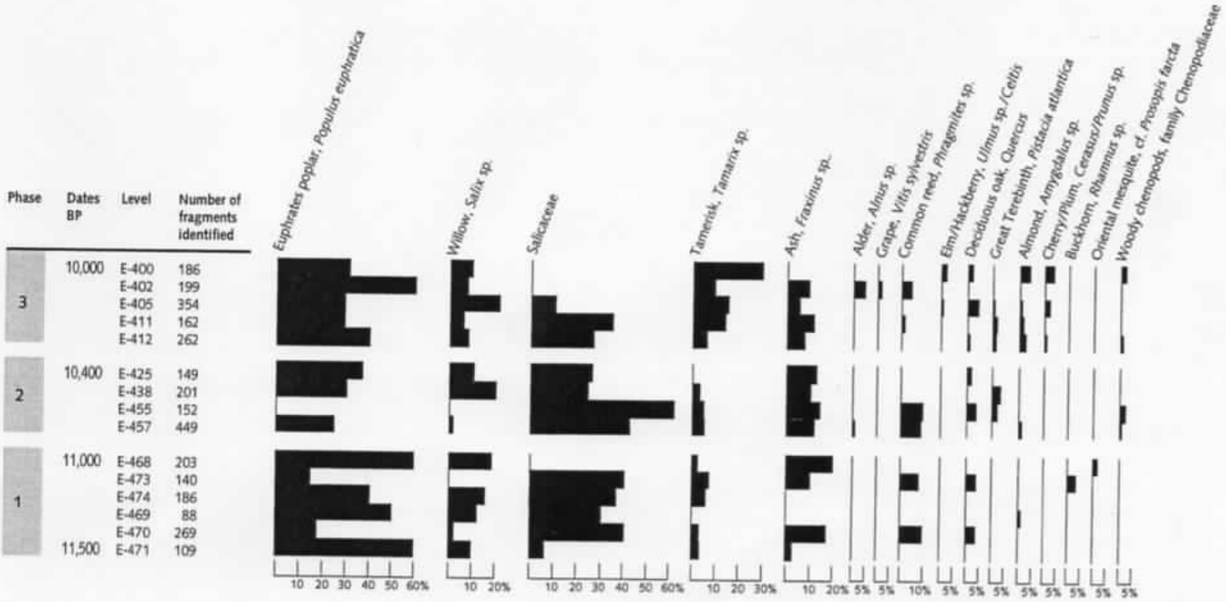
We examined the charcoal using standard laboratory techniques (Vernet 1992). Our identifications were based on comparisons with reference material we have collected in the field from a large number of locations in Southwest Asia, and we also consulted three atlases of wood anatomy (Greguss 1959; Schweingrüber 1990; Fahn, Werker, and Bass 1986). The diversity of species in Southwest Asia made specific identifications difficult in most cases. For example, about 30 species of oak, 28 of buckthorn, and 17 of almond grow in the region today (Zohary 1973, pp. 353, 357).

The charcoal from Abu Hureyra 1 was finer and more fragmented compared to charcoal from other sites on the Middle Euphrates that we have analyzed. Oak was broken along the rays and at right angles along the growth rings, producing very small fragments. We sorted the fine fraction of the charcoal from levels 470, 473, 455, and 405 using a low-power microscope, and this may account for the higher frequencies of oak compared to the other samples. Because of the bias introduced by fragmentation, the small differences in frequencies between woodland-steppe species are probably not significant.

It is clear from the results (figure A6.1) that the inhabitants of Abu Hureyra 1 obtained most of their fuel from the gallery forest in the Euphrates Valley. The valley contained an abundance of trees with soft wood that were easy to cut down and that regenerated rapidly. Woodland-steppe trees such as the great terebinth, oak, and almond have very hard wood and would have been preserved for their fruits (Hillman, Colledge, and Harris 1989, p. 224). The wood charcoal and fruits of woodland-steppe species found at Abu Hureyra indicate that these trees grew in the area during the occupation of the site, although they are no longer found there today. While one might argue that some wood could have floated down the Euphrates from farther north, there are several reasons to suppose that this is not the case. First, species such as conifers characteristic of moister vegetation zones upstream have not been found at Abu Hureyra; second, oak charcoal has been recovered from five sites along the Middle Euphrates, one of which (Halula) is about 5 km from the river; third, most of the charcoal has very narrow growth rings, indicating that the trees grew on drier soils well away from the river.

The woodland-steppe association of Abu Hureyra 1 resembles vegetation found occasionally in the central part of Syria today, though it is now highly degraded. This association occurs in upland areas above 700 m where annual rainfall exceeds 300 mm. Relicts of what were once more extensive stands occur on the Jebels Abdul Aziz, Bishri, and Abu Rujmein. The Jebel Abdul Aziz has species such as oriental almond (*Amygdalus orientalis*), great terebinth, red haw-

Figure A6.1 The wood charcoals from Abu Hureyra 1: the frequencies of charcoal fragments of each taxon, calculated as the percentage of the total number of fragments identified from that sample.



thorn (*Craetagus azarolus*), and miniature cherry (*Cerasus microcarpa*), but it lacks oak that was present at Abu Hureyra. These species also form part of the deciduous oak forest in areas above 800 m with over 500 mm of annual rainfall. The Jebel Sinjar is a good example. In Transjordan and Asia Minor, Tabor oak and Brandt's oak occur as dominants of the woodland-steppe vegetation that fringes the steppe.

The gallery forest was much richer in species during the Epipalaeolithic, but today it is very degraded. The only species that remain and are still exploited are Euphrates poplar, tamarisk, willow, and common reed. The diversity of species may have been partly due to the moister, cooler conditions that prevailed early in Abu Hureyra 1 times, but it is also likely that several species have simply died out because their habitat has been greatly reduced by human exploitation of shade-providing trees such as Euphrates poplar and clearance for valley-bottom agriculture. Species such as alder, vine, and ash are found today in gallery forest farther north at higher altitudes in Anatolia and the Zagros. In northern Mesopotamia, Syrian ash (*Fraxinus syriaca*) forms pure stands in the mountain gallery forest (Guest and al-Rawi 1966, p. 84). Common reed, which is well represented in the charcoal, could have been used as a building material.

We identified relatively small quantities of charcoal of steppe plants, such as the chenopods. They may be underrepresented because the occupants preferred woodland species that were more effective as fuel and much easier to gather.

Our results do not show any major changes in the exploitation of woody species during the occupation of Abu Hureyra 1. The climatic changes that were taking place may not have affected the availability of woody species in the same way as they influenced fruit and seed collecting or pollen production. It is possible that during periods of climatic deterioration the woodland-steppe species may have been limited to only the most favorable habitats. Oaks may have been restricted to deep soils that retained moisture such as in the side valleys leading down from the steppe plateau to the Euphrates.

The woodland-steppe species that we have identified at Abu Hureyra 1 were also represented in charcoal from the sites of Jerf el Ahmar, Dja'de, and Halula, situated 50 km upstream and dating from the tenth and ninth millennia BP, but there is no direct local evidence as to when these species first colonized the Syrian steppe. High-altitude pollen sites such as Lake Zeribar and Lake Van indicate that conditions during the last Ice Age did not permit woodland vegetation to grow in the Zagros and in eastern Anatolia. Low-altitude pollen sites such as Lake Huleh and the Ghab are in areas where there was a strong Mediterranean influence. Oak was insignificant at lakes Zeribar and Van during the Late Glacial and did not expand there until well into the Holocene, although it was definitely present in the Mediterranean zone during the glacial maximum (Baruch and Bottema 1991, p. 11; Kislev, Nadel, and Carmi 1992, p. 162). In the Syrian steppe, the earliest data come from Abu Hureyra 1. Given the evidence for lower temperatures, it is possible that depressions from the Mediterranean penetrated farther east into the Syrian steppe, making it more favorable to tree species at a relatively early date during the cooler periods that preceded the occupation of the site (Hillman 1996). In the steppe of southern Transjordan pollen analyses of aerobic archaeological sediments from sites on the Jebel Mishraq indicate the sporadic presence of deciduous oak pollen during the Epipalaeolithic (c. 16,000–12,500 BP; Emery-Barbier 1995, p. 380).

The evidence of the charcoal suggests that conditions were cooler and perhaps moister during the occupation of Abu Hureyra 1. Today's 200 mm annual rainfall at Abu Hureyra could not have sustained the woodland-steppe vegetation that occurred there in the twelfth and eleventh millennia BP. The climate in areas of higher altitude where we find this kind of vegetation today is cooler and moister, so it would appear that the wooded zones occurred at lower altitudes during the Epipalaeolithic. However, estimating the annual rainfall from the charcoal evidence is problematic. The present-day woodland-steppe vegetation requires a minimum of 300–350 mm of annual rainfall, but given the cooler temperatures that prevailed during the occupation of the site, this figure may have been somewhat lower.

Appendix 7 Location of the Material Recovered from the Excavation

The Directorate General of Antiquities and Museums in Syria divided the artifacts from the excavation in Aleppo in 1977; it retained half for deposit in the Aleppo Museum and duly allocated the other half to the expedition under the terms of the excavation agreement. That material has been further divided among the ten museums that contributed to the project and sent on to them as study of it has been completed. All artifacts from any one stratigraphic sequence have been kept together so that the collections now held by the institutions that supported the project are as complete and representative as possible. We have also attempted to group subdivisions of the material in museums that are situated close to each other geographically. They thus retain the maximum possible value for students who may wish to conduct their own studies of the artifacts. The details of these dispositions are given in table A7.1.

The Syrian authorities graciously allowed us to export all the organic remains for study and curation. They are now in London. The human remains have been presented to the British Natural History Museum. The animal bones and other faunal remains are presently housed at the Centre for Extra-Mural Studies, Birkbeck College, University of London, while study of them continues; we anticipate that they will eventually be transferred to the Natural History Museum. The flotation samples are currently in the Archaeobotany Laboratory of the Institute of Archaeology, University College, London, where they, too, continue to be analyzed. They will be presented to another institution for long-term curation in due course.

Appendix 8: Data Tables

We take seriously our obligation to publish all the data recovered from the excavation. Other scholars need to be able to examine in detail the information from which we have derived our conclusions. They should also be able to conduct their own analyses, perhaps using new approaches that will illuminate further the extraordinary record from the site. The data are so abundant that it has seemed best to make them available as an electronic archive. They may thus be stored cheaply and yet readily be examined by scholars anywhere in the world who have access to the Internet. Furthermore, we can add new data to the archive as our own studies continue, thus increasing its value to other scholars in the years to come.