

Sedentarization and Nomadization

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HESBAN

Series Editors

Lawrence T. Geraty
Øystein Sakala LaBianca

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SEDENTARIZATION AND NOMADIZATION:

FOOD SYSTEM CYCLES AT
HESBAN AND VICINITY
IN TRANSJORDAN

by

Oystein Sakala LaBianca
(Andrews University)

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HESBAN 1

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Chapter Four

From Archaeological Information to Food System Configurations

Introduction

In the previous chapters, a three-tiered foundation was laid in preparation for the work which begins with the present chapter: piecing together from archaeological information the story of how people at Hesban and vicinity provided for their food needs in the distant past. In Chapter One, the first of these tiers was laid down in the form of a general methodological framework anchored on the concept of the food system. The second tier, laid down in Chapter Two, involved a discussion of how various environmental, cultural, and social factors characteristic of the Middle East as a region cooperate to produce, by means of the processes of sedentarization and nomadization, cyclic patterns of food system intensification and abatement. The third tier, laid down in Chapter Three, involved becoming intimately acquainted with the changes which have taken place within the project area in the recent past so as to obtain a better heuristic understanding of the workings of the local food system. This, as we shall see, has been an essential preparation for the challenging task of piecing together, from the fragmentary archaeological record, the long-term history of food system intensification and abatement within the project area.

In the present chapter my purpose is to make explicit the assumptions, methods, and procedures upon which reconstruction of past food system conditions within the project area is based. As my goal in the succeeding chapters is not merely to offer a descriptive account of raw data, but to interpret it in the light of a particular set of assumptions about what it means, it is important that the reconstruction procedures followed and the extent and limitations of the evidence used for this purpose be

made explicit. While this has already been done at a more general level previously, the present chapter deals with specific questions and problems which need to be addressed given the particular nature of the research context and archaeological information that has been dealt with.

Among these questions are, for example, to what extent has previous archaeological research in Jordan prepared the way for the investigation of food system conditions and configurations attempted here? To what extent were the various lines of research carried out in connection with the Heshbon Expedition related to the goals and requirements of the present undertaking? What are the extent and limitations of the findings of the Heshbon Expedition in terms of these goals and requirements? How were data about food system conditions derived from the archaeological information gathered by the Heshbon Expedition? How were food system configurations, in turn, derived from these data in the case of each of the historical periods investigated?

By way of a rationale for the organization of the discussion which follows, something needs to be said about how the empirical evidence generated in connection with the Heshbon Expedition catalyzed and shaped the development of the theoretical framework presented in the previous chapters. To begin with, as was explained briefly in Chapter One, my initial preoccupation with the analysis and interpretation of animal bone information—in searching for some way to connect our findings to what was being discovered in other expedition undertakings such as the regional survey and the stratigraphic excavations on the tell—eventually led to the adoption of the food system concept as a tool in discovering interconnections between these different lines of research (LaBianca 1984).

Additionally, my prioritization, for the purpose of operationalizing the food system concept, of environmental, settlement, landuse, operational, and dietary conditions can be directly attributed to insights gained from previous experience with the empirical materials from Tell Hesban and vicinity. These dimensions, as we shall see further on, could each be linked fairly directly to a number of data points having been generated by the project. For this reason they seemed to furnish a good solution to the problem of how to operationalize the food system concept. Once these tools were put to use in analyzing the data, they led to findings suggestive of the dynamic processes of intensification and abatement and their corollaries in the Middle East, namely sedentarization and nomadization.

In recognition of the priority of the empirical findings, both in terms of their prior availability and their role in stimulating the search for a methodology, I begin the development of this chapter by focusing on the empirical context out of which this research project emerged and end by showing how the food system concept facilitated my analysis of this material. Specifically I shall begin by offering a brief background to the way in which previous archaeological research in Transjordan has prepared the way for the present undertaking. This is followed by a discussion of the procedures used to derive data about food system conditions from the archaeological information on hand from the Heshbon Expedition. Last, I discuss the procedures followed in deriving food system configurations from the data.

Previous Archaeological Research in Transjordan

Before entering upon a discussion of previous and concurrent archaeological research in Transjordan, a question which needs to be addressed is why limit this overview strictly to this region? Certainly, when it comes to the cultural history of Transjordan, the region has been intimately linked to happenings in the Levant as a whole, including modern Israel, Lebanon, and Syria, as well as the larger Middle East. Furthermore, when it comes to the intellectual context in which archaeology in Transjordan has been carried out, an even wider sphere of influences can be pointed to, especially influences emanating from Europe and the United States. While acknowledging this situation, I feel justified in restricting this review to Transjordan for

three reasons: First, such a focus serves to heighten awareness of the extent to which cumulative research dealing specifically with this region has progressed. Second, such a focus is useful as an orientation to what is known about the archaeological history of Transjordan as a cultural area with its own unique physical environment and cultural history. Third, such a focus would logically come first in a hierarchical arrangement of regional foci (next would be Palestine as a whole, the Levant as a whole, the Middle East, and so on). As reviews of these broader regions already exist (cf. Albright 1932; Wright 1966; King 1984; Sterud, Strauss, and Abramovitz 1980; Glock 1985) my focus on Transjordan seems appropriate and within the scope of what is practical given the goals of the present study.

An outline of the development of archaeological research in Transjordan has recently been prepared by Geraty and Willis (1986). While acknowledging the historical ties of Transjordan to Cis-Jordan, they argue that the former has its own history of research. This history they divide into seven distinct periods. The first and longest period began during the Byzantine Period and lasted until 1805. This was a period of visits by pilgrims and Arab geographers to Transjordan, many of whom authored accounts of their journeys.

The second period, which Geraty and Willis called "the rediscovery of Transjordan," began in 1805 with the visit to the region of the first of a dozen or more scientifically motivated explorers, namely Ulrich Jasper Seetzen (1813). This period included individuals like Burckhardt (1822, 1831), Irby and Mangles (1823), Buckingham (1825), Tristram (1873), and many others and ended with the visit of Duc de Luynes in 1864. Next came the years between 1868 and 1923 which emphasized mapping and exploration by individuals such as Merrill (1877, 1881), Conder (1889), Schumacher (1886), Brunnow and Domaszewski (1904), and Musil (1907).

The fourth period lasted from 1923-1948 and was a time of pioneer excavations in Transjordan. It was at the beginning of this period that a Department of Antiquities was established in Transjordan by the British Mandate government. Under the initial leadership of John Garstang and subsequent leadership of Lancaster Harding, this department "greatly encouraged and facilitated both further exploration and the first excavation in

Transjordan" (Geraty and Willis 1986: 5). Particularly ambitious and influential was the surface survey of the entire country of Transjordan carried out by Nelson Glueck between 1933 and 1946. Geraty lists 21 excavations as beginning during this period, including undertakings at Qalat al-Rabad, Amman, Jerash (Geresa), Petra, Teleilat el-Ghassul, Wadi Ramm, 'Ader, Baluah, Marwa, Tell el-Kheleifeh, Ma'in, Wadi Dhobai, and el-Husn.

The fifth period of archaeological research in Jordan (1948-1956) concentrated on single-occupation architectural and tomb sites on both sides of the Jordan River and the Dead Sea under the jurisdiction of the Department of Antiquities. Sites mentioned by Geraty and Willis in this connection include Ala Safat, Sahab, Jebel Jofeh (Amman), Madaba, Dhiban, El-Ghrubba, Jerash, Khirbet Iskander, and Petra.

The period beginning in 1956 and ending in 1967 is a time during which stratigraphic excavation methods and *tell archaeology* became perfected in Transjordan as a result of the leadership provided by Dame Kathleen Kenyon at Tell es-Sultan (Kenyon 1952; cf. Wright 1966; Petrie 1904). Among the sites which were dug by her students or individuals who had been influenced by her methods were Qweilbeh, Beidha, Umm el-Biyara, Jerash, Wadi Ramm and Risqeh, Tell Deir 'Alla, Teleilat el-Ghassul, 'Araq el-Emir, Tell er-Rumeith, 'Ara'ir, Tell es-Sa'idiyeh, Amman, Bab edh-Dhra, Umm Qeis, Tabaqat Fahil, and Madaba. Also carried out during this period was Mittmann's (1970) survey of northern Transjordan.

The most recent period in the development of archaeological research in Transjordan began in 1967. During this period over 40 different excavation projects have been fielded in Transjordan, a large number of these under the sponsorship of the American Center for Oriental Research (ACOR) which was established in 1967 after the Six-Day War. Characteristic of this period has been the introduction of multidisciplinary and regional approaches at several of the major excavation sites, particularly at Tell Hesban (since 1968), Bab edh-Dhra (since 1975), and Pella (since 1976). Another important development, especially in the past decade, has been the escalation of regional surveys (cf. Banning 1986; Graf 1980; Henry 1980; Lundquist 1980; MacDonald 1980; McCreery 1980; Miller 1980; Sauer 1980; McGovern 1983, 1985, 1986; Lenzen and McQuitty 1983).

Thanks to all of the above undertakings, Transjordan today is hardly the *terra incognita* it was regarded as three decades ago and earlier from the standpoint of archaeological research. Indeed, in terms of published descriptions of tell-sites, chronologies, stratigraphic horizons, studies of assemblages of artifacts, accounts of architectural remains, epigraphic studies, and histories of isolated periods, especially those relevant to biblical history, a base line of the archaeological history of the country is now in hand. For example, Sauer (1980), who was the director of ACOR between 1971 and 1981, wrote a booklet summarizing what is known of that archaeological history. His booklet presents an overview of representative sites, artifacts, and pottery manufacture traditions in Jordan, from the Palaeolithic through the Late Ottoman Period. His chronological scheme divides Transjordan's history into the following periods: Palaeolithic, Mesolithic, Neolithic, Late Neolithic, Chalcolithic, Early Bronze I-III, Early Bronze IV-Middle Bronze I, Middle Bronze II, Late Bronze I-II, Iron IA-C, Iron II-Persian, Hellenistic, Nabataean (or Roman), Byzantine, Abbasid, Fatimid, Seljuq-Zengid, Crusader, Ayyubid-Mamluk, and Ottoman. The current state of archaeological research in Jordan is well represented in the proceedings of three international symposia dealing with its history and archaeology (Hadidi 1982, 1985, and 1987).

Largely neglected in archaeological research on Transjordan, however, are attempts to understand its cultural history in light of anthropological theory about how and why cultures change. One obvious reason for this state of affairs is that, until recently at least, this problem has largely been outside of the agenda of the scholarly community working in the country, most of whom were not anthropologists, but historians, epigraphers, biblical scholars, and classical archaeologists. As the conventional approach in disciplines such as these entails specialization around problems relating to a specific historical period, a specific assemblage of artifacts or texts, or even a specific personality or historical event, it is understandable that the largely anthropological problem of how cultures change has not surfaced as a primary focus of research. Yet, few places on earth offer a better empirical arena for addressing this question than Transjordan. This is because in addition to a relatively well-preserved archaeological record,

Transjordan is also well represented in the literary records of antiquity. It is therefore among the best suited regions in the world in terms of its potential as an empirical arena for research concerned with longitudinal patterns of culture change.

When it comes to studies specifically concerned with ancient food systems in Transjordan, a paradoxical situation exists. As we have already seen, information relevant to reconstructing ancient food system conditions, such as descriptions of reservoirs, cisterns, wine presses, pottery jars, coins, houses, agricultural implements, economic texts, etc., have been included in nearly every research report dealing with Transjordan since the days of the 19th-century scientific explorers. Yet, most of these reports fail to treat these finds systematically in terms of their function within the local food system. For example, to the extent that descriptions of pottery have been included in excavation reports, they represent a potential source of information about the local food system. Yet, insofar as these same reports fail to deal explicitly with the functional uses of the pottery which they discuss, they fail to contribute to our understanding of the food system in an integrated sense. This is not to minimize the important questions such studies have addressed relative to the dating and spread of a particular type of vessel from one region to another; it is instead to suggest an additional perspective from which to view such materials.

Publications attempting to contribute to our understanding of food systems in a broad sense have, until recently, been few and far between. Notable because of their efforts to change this situation are the recent contributions of individuals such as McCreery (1979, 1980), Franken (1982), Helms (1981, 1982), Henry (1980, 1985), Fuller and Fuller (1983), Piccirillo (1985), Parker (1986, 1987), Rollefson (1985), Rollefson and Simmons (1986), Schaub (1982), McGovern (1986), Banning (1986), Banning and Köhler-Rollefson (1986), Ortner (1978), Prag (1985), and Villeneuve (1985). In the case of each of these scholars is a commitment to understand, in a broader sense, dynamic aspects of the cultural history of ancient Transjordan.

From Archaeological Information to Food System Conditions

Insofar as the original goals and methods which governed fieldwork at Tell Hesban and vicinity

were much the same as those of other leading projects being carried out in Transjordan and Israel at the same time, it cannot be said that, from the start, the goals and fieldwork procedures were designed with a food system perspective in mind. Although, as discussed earlier, this perspective evolved as a result of an ongoing quest to discover how the various findings generated by the project fitted together, the fact remains that what accumulated in the way of archaeological finds on the expedition, for example, resulted more from a firm commitment to *tell archaeology* and a particular method of investigation, namely the Wheeler-Kenyon method of stratigraphic excavation (pl. 4.1) together with careful recording procedures, than from an explicit concern with any particular anthropological problem (cf. Wright 1974; Kenyon 1952; cf. Barker 1977). Thanks in particular to Roger S. Boraas, the expeditions' Chief Archaeologist (pl. 4.2), who insisted on careful attention to soil layers and their relationship no matter what the historical significance of a particular stratum, a body of stratigraphic findings gradually accumulated from Tell Hesban which covered the entire historical spectrum of Transjordan from the 12th century B.C. to the present (fig. 4.1). A similar situation pertains to the regional survey finds, none of which were collected with an explicit concern, for instance, for matters related to how land was utilized or how food was stored by the ancient inhabitants of the project area.

As a consequence of the manner in which most of the findings from Tell Hesban were generated, I have preferred to refer to the original body of findings with which I have been working as *information*, in the sense of an accumulated corpus of archaeological facts and figures, rather than as *data* or *evidence*, in the sense of empirical findings gathered with reference to an explicitly stated theory of one kind or another. Therefore, because of the fact that the theoretical perspective around which I have organized this analysis emerged largely after these findings had been accumulated, there are many gaps and inadequacies in this body of findings for which the best excuse is simply that such is the cost of attempting to go beyond the empirical materials themselves in order to gain deeper insight into what they mean. An example of this situation would be the fact that few data were gathered dealing directly with the project areas' nonsedentary populations (cf. Hole 1978; Orme

Plate 4.1 Wheeler-Kenyon method of excavation as employed at Tell Hesban

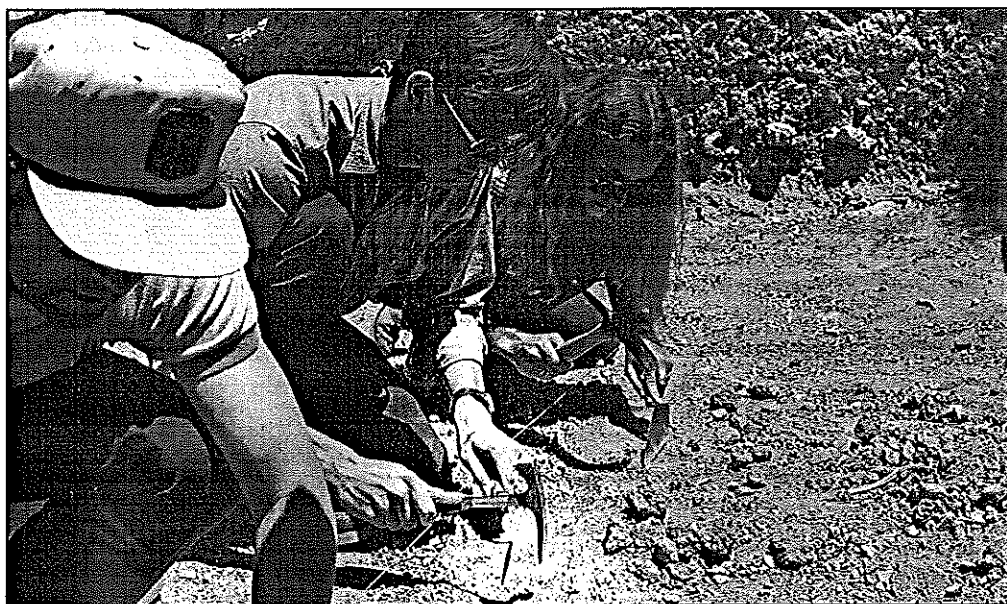


Plate 4.2 Chief archaeologist Roger Boraas giving instructions



Stratum	# of Loci	Period	Approximate Dates	Approximate # of years
1 AM01	68	Modern	A.D. 1870-1976	ca. 106 yrs
gap		Ottoman	A.D. 1456-1870	ca. 414 yrs
2 AM02	379	Late Mamluk	A.D. 1400-1456	ca. 56 yrs
3 AM03	787	Early Mamluk	A.D. 1260-1400	ca. 140 yrs
4 AM04	126	Ayyubid	A.D. 1200-1260	ca. 60 yrs
gap		Fatimid	A.D. 969-1200	ca. 231 yrs
5 BA01	56	Abbasid	A.D. 750-969	ca. 219 yrs
6 BA02	210	Umayyad	A.D. 661-750	ca. 84 yrs
7 BA03	55	Late Byzantine	A.D. 614-661	ca. 47 yrs
8 BA04	259	Late Byzantine	A.D. 551-614	ca. 63 yrs
9 BA05	340	Early Byzantine	A.D. 408-551	ca. 143 yrs
10 BA06	255	Early Byzantine	A.D. 365-408	ca. 43 yrs
11 HR01	308	Late Roman	A.D. 284-365	ca. 81 yrs
12 HR02	199	Late Roman	A.D. 193-284	ca. 91 yrs
13 HR03	399	Late Roman	A.D. 130-193	ca. 63 yrs
14 HR04	417	Early Roman	63 B.C.-A.D. 130	ca. 193 yrs
15 HR05	290	Late Hellenistic	198-63 B.C.	ca. 135 yrs
gap		Late Persian	500-198 B.C.	ca. 302 yrs
16 IR01	58	Iron 2	700-500 B.C.	ca. 200 yrs
17 IR02	42	Iron 2	900-700 B.C.	ca. 200 yrs
18 IR03	30	Iron 2	1150-900 B.C.	ca. 250 yrs
19 IR04 & IR05	82	Iron 1	1200-1150 B.C.	ca. 50 yrs

Fig. 4.1 Tell Hesban strata (Mitchel 1980¹; cf. Boraas and Geraty 1979 [in Appendix A])

1981: 255-272; Robertshaw and Collett 1983; Arnold 1985: 109-126). It simply was not part of either the original excavation goals or the survey goals to do so, as in both cases the ultimate focus of interest was the study of tells. Yet, serendipitously, a limited amount of data was collected which has been utilized as evidence in the present study for this particular problem, especially by the regional survey.

My aim in this section is to describe in further detail the steps which have been taken in order to convert the various lines of information which have resulted from the careful stratigraphic excavations at Tell Hesban and from the regional survey, into a formally organized body of data relevant to the problem being investigated here. Specifically my aim is to describe how, in the case of each of the ten lines of information mentioned in Chapter One, a connection could be made to one or more of the five parameters of the food system. In so doing, the extent and limitations of the available data will become further apparent.

The types of questions which guided the process of converting this information into data about ancient food system conditions were as follows:

To ascertain *environmental conditions*: what do these finds reveal about the types of soils, or about the communities of plants or animals which existed?

To ascertain *settlement conditions*: what do these finds reveal about the mobility status of the population; about its ethnic identity; about its size and composition; about its distribution within the project area?

To ascertain *landuse conditions*: what do these finds reveal about the way in which the land was utilized, whether for collecting or hunting, grazing of livestock, or growing of field crops, gardens, or orchards; about the type of utilization which predominated in the various subregions of the project area at a given point in time?

To ascertain *operational conditions*: what facilities, tools, and equipment were constructed, maintained, and utilized during this particular period judging from the presence of these finds?

To ascertain *dietary conditions*: what do these finds tell us about what people ate and about their nutritional status during this particular period?

An important advantage of the food system perspective came to light as questions such as

these were being asked, namely the way in which this perspective made possible a more systematic approach to determining the uses of a number of finds about which several alternative interpretations had been advanced regarding their function. In such cases, this perspective allowed me to follow a process of elimination which always began with the question of how a particular find might be accounted for in the light of its use in the food system. Once the possibility of its having had a function in the food system had been ruled out, other alternative interpretations could be pursued further. Thus where disputes had arisen over alternative interpretations of a particular find, an *a priori* principle—namely that functional uses in terms of the food system must first be ascertained—could be appealed to in weighing the relative merits of competing proposals. The following, then, is an account of how the various lines of archaeological information on hand were converted into data regarding food systems conditions.

Archaeological Stratum Descriptions

Excavations at Tell Hesban were concentrated in sectors of the tell referred to as *areas*, each identified by a capital letter (see fig. 4.2 and pl. 4.3). Four principal excavation areas were begun during the first campaign at Tell Hesban (Boraas and Horn 1969: 102-117). Areas A and D were in the acropolis sector near the summit of the tell in order to ascertain information about the nature of the ruins of public buildings in evidence on the tell.

In order to allow maximum stratigraphic penetration in the first season, a sector on the southern slope of the tell, which was deemed suitable because it was free of any visible surface remains, was opened. This sector was designated Area B. Finally, Area C, which was located on the western slope of the tell, was begun in order to intersect the defense perimeter walls of the site. In subsequent seasons, soundings were carried out in several locations (Areas E and F) on the lower slope of the tell and in the village of Hesban. In addition, as mentioned in Chapter One, over 40 tombs and caves were excavated in Area F. This area was located to the southwest of the tell in what was believed to be the location of the ancient Roman and Byzantine cemetery.

The portions within each area opened for excavation, whatever their geometric shape, were called

squares. Most of these measured approximately 7 m x 7 m and were excavated to bedrock. Within each square, the fundamental unit of recording was the *locus* which was defined as "any discernible soil layer or any 'thing' (wall, pit, hearth) within or related to a given soil layer" (Boraas and Horn 1969: 112). Locus numbers were assigned in chronological sequence within each square. Thus, any provenience unit or findspot within a square was traceable by means of a standard findspot number including the designation of the campaign season, the area, the square, and the locus (for example, Heshbon '71, Area A, Square 3, Locus 25 or simply H71A.3:25).

It is important to clarify that, as a result of the excavation strategy which was followed, less than one percent of the settlement area considered to belong to Tell Hesban—namely, most of the area today settled by villagers plus the mound where most of the excavations took place (cf. Conder 1889)—was actually investigated by means of stratigraphic excavations. Although several small probes (in Area G) were carried out beyond the mound itself in various locations in the village, the conclusions reached with regard to stratigraphy pertain mainly to the mound where Areas A, B, C, and D were excavated. As far as the exposure of architectural remains are concerned, here too, limitations exist as portions of buildings which extended beyond the restricted vertical balks of a certain square or area were normally not uncovered.

It must also be noted that, except in the case of certain occupational surfaces or when the contents of certain cisterns were excavated, sieving was not normally carried out. That a large number of coins, and especially small fish, bird, and mammal bones, were missed because of very restricted use of sieves is certain. This, at least, is the impression gained based on results obtained in a *test square* operated in Area C in 1976 where sieving was done consistently in half of Square C.9 and not at all in the other half of the same square (Boraas and Geraty 1978: 10, 14; LaBianca 1978a: 241).

The findings which resulted from the stratigraphic excavations were recorded on locus sheets. These, in turn, formed the basis for the end-of-the-season preliminary reports authored by the respective area supervisors (Boraas and Horn 1969, 1973, 1975; Boraas and Geraty 1976, 1978). Between 1976 and 1980, the locus information gathered during each of the excavation seasons was comput-

Fig. 4.2 Topographic map of Tell Hesban showing excavation areas

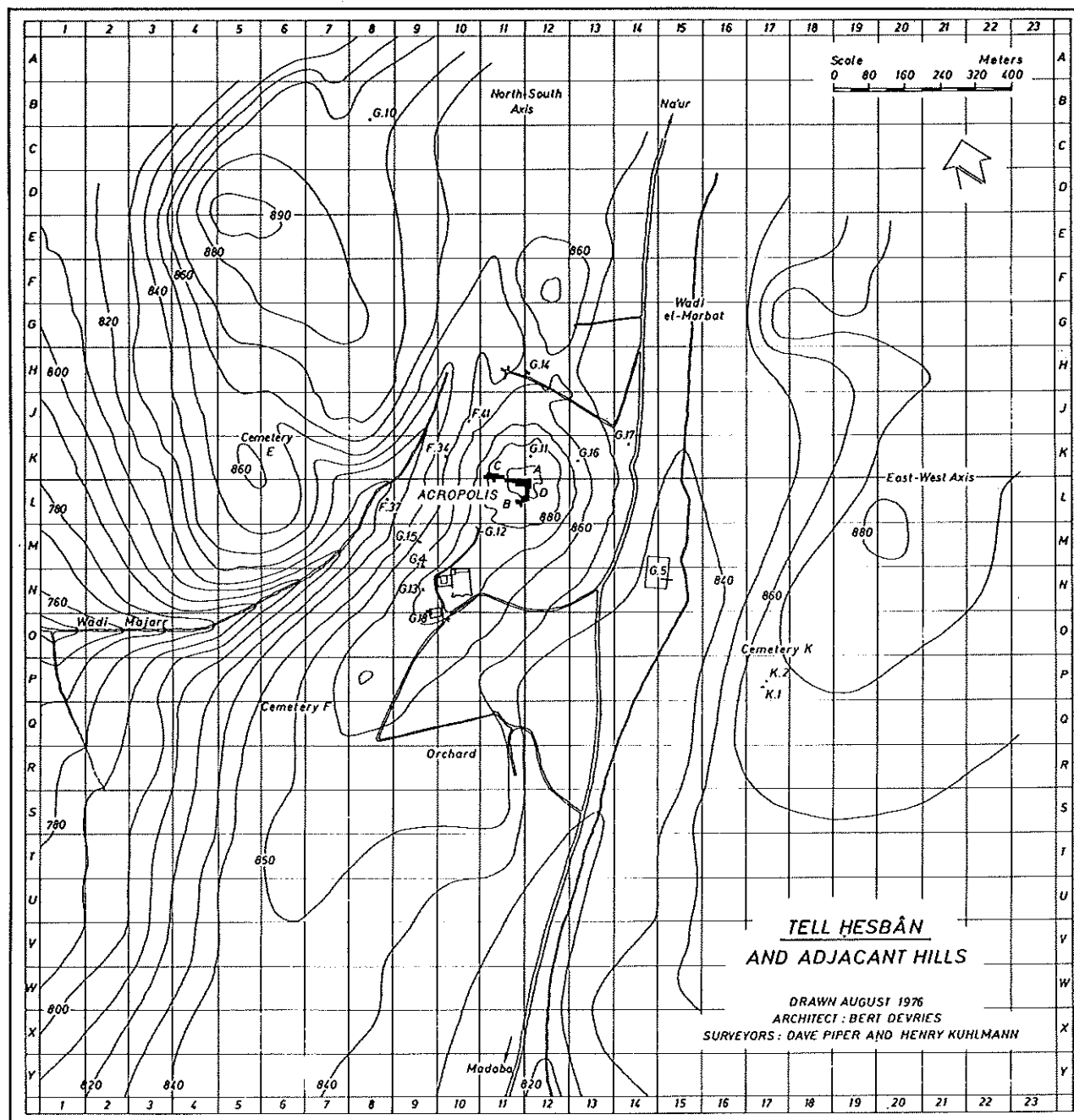


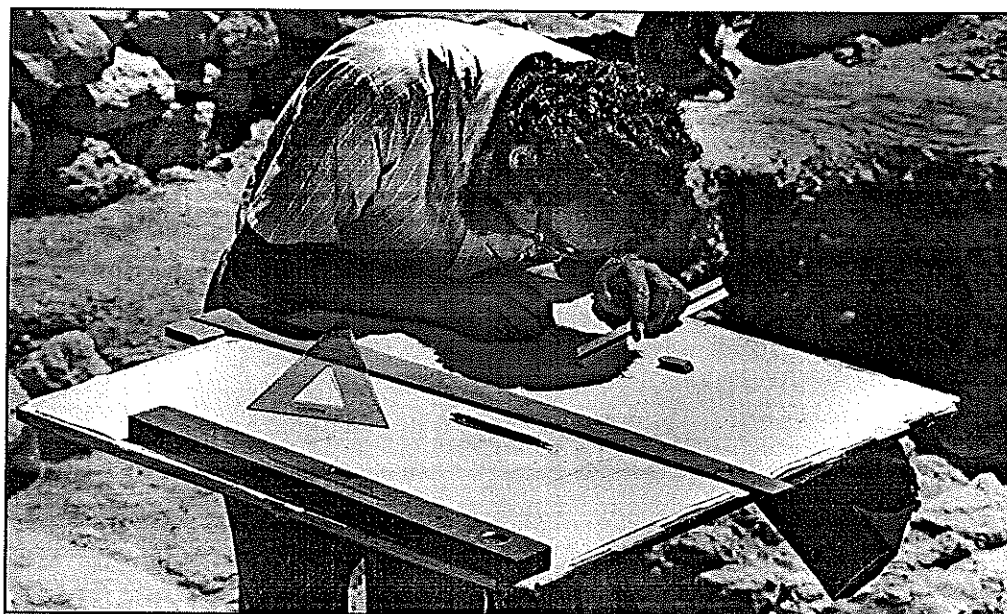
Plate 4.3 Aerial photo of excavation areas (1971); view north



Plate 4.4 Sieving process in A.6



Plate 4.5 Architect Bert de Vries at work in the field



erized as a result of a cooperative endeavor involving James Brower, Bert de Vries, Larry Geraty, Larry Herr, Øystein LaBianca, Larry Mitchel, and Bjørnar Storfjell. Available for use by this investigator were drafts of final reports on the Iron Age (Herr forthcoming), Hellenistic and Roman periods (Mitchel 1980), and the Byzantine and Early Islamic periods (Storfjell 1983) which had been written following completion of the standardized computer-generated listing of all loci resulting from the first five campaigns at Tell Hesban. These loci, in turn, were assigned to one of 19 strata, as mentioned in Chapter One. It is the interpretive results contained in these end-of-the-season preliminary reports and these final report drafts which constitute the first of the ten lines of information examined in this study.

In converting this information into data for use in the present study, the manuscripts which had been prepared on the basis of the computerized locus information were scrutinized for information primarily about operational conditions such as the type and quantity of cisterns, water channels, storage bins, fortification walls, paved streets, baking ovens, kilns, and fire pits. Also noted were proposals regarding the size and nature of settlement conditions during the time of a given stratum.

Pottery Readings

Insofar as field readings of pottery constituted the principal material on the basis of which other finds were dated by association, it played a crucial role in furnishing a temporal framework for chronologically ordering of other types of data relied on in this study. Although ceramic artifacts have great potential also as a source of data about environmental conditions (nature of local clays), settlement conditions (identity of ethnic groups to which potters and users of pottery belonged), operational conditions (arrangements for storage, transportation, and preparations of foods), and dietary conditions (traces of food on insides of sherds), information of this kind was not available for this analysis (cf. Crowfoot 1932; Rice 1981; Bishop, Rands, and Holley 1982; Ellison 1984; Arnold 1985).

Registered Small Finds

A computer listing of 2,800 registered small finds ordered according to stratum provided an-

other source of data mainly about operational conditions during successive periods of occupation at Tell Hesban. Such conditions were inferred from analysis of the proportional representation in each stratum of objects such as grinding stones, mullers, spindle whorls, coins, and so on. While much could be learned about local craftsmanship during various historical periods from detailed examination of these objects individually, such analysis has not been attempted in this study (cf. Dalman 1964).

Animal Bones

The extensive use made here of animal bone information requires that the many limitations of these data be made as explicit as possible. To begin with, as noted earlier, the quantity of fish, bird, and small mammal remains represented in the animal bone corpus is not what it could have been had sieving been done in all squares (cf. Casteel 1972; Payne 1972). Furthermore, during the first four seasons, '68, '71, '73, and '74, a portion of the bone material brought to the *bone tent* by the square supervisors was discarded because it was not judged identifiable at the species level (cf. Lawrence 1978). This *scrap* consisted mostly of splinters of long bones, ribs, and vertebrae which were so fragmentary that articulating surfaces were usually altogether absent. Since it was only during the 1976 season that all such scrap could be identified, thanks to the participation of J. Boessneck and A. von den Driesch, quantitative analysis to determine the composition of the domestic animal species during various periods has only been undertaken on the bone corpus from the 1976 season which consisted of about 19,000 fragments. During that same season, however, Professors Boessneck and von den Driesch also analyzed all the boxes of bones saved from previous seasons, measuring all measurable bones and separating out any rare bones which had been missed during the earlier seasons' bone readings (cf. Boessneck and von den Driesch 1978a, 1978b).

Another limitation of animal bone data, which also applies to all other small finds, is that a large proportion of it came from *fill* loci. Most productive in terms of bones uncovered were cisterns and the huge Area B reservoir. Because the vast majority of bones were found in such deposits instead of on floor surfaces or on streets or walls, they were preserved better than might have been the case.

Plate 4.6 Jim Sauer (far right) reading pottery (with, from left, Douglas Waterhouse, Larry Geraty, and Robert Ibach)

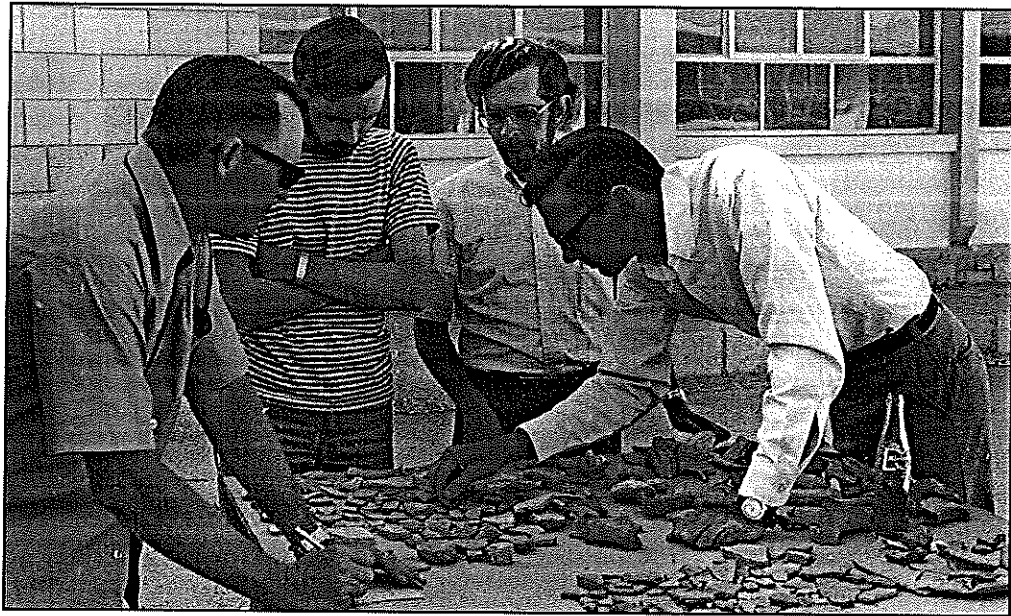


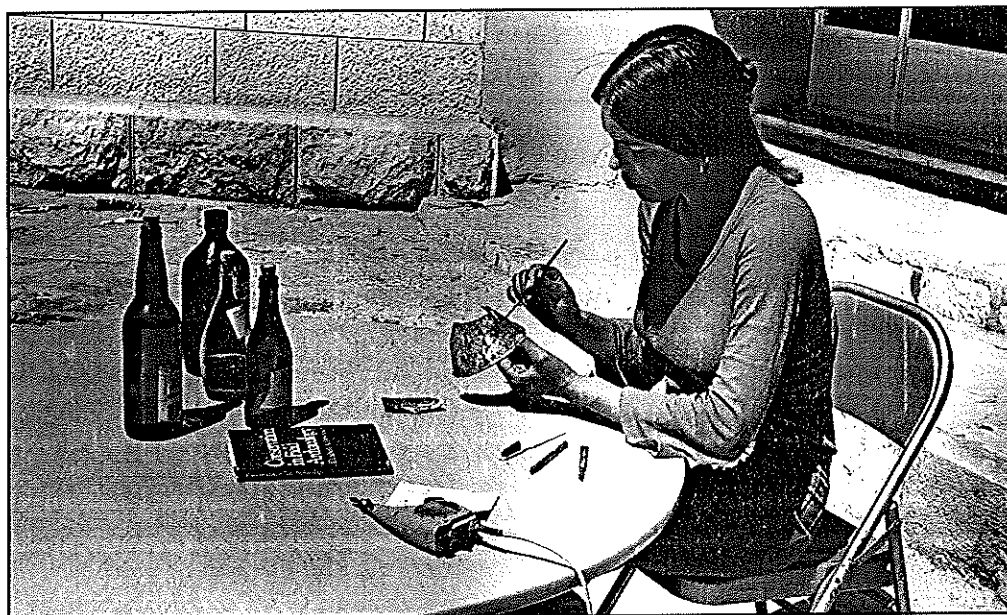
Plate 4.7 Aina Boraas reconstructing pottery



Plate 4.8 Marion Beegle registering small finds



Plate 4.9 Object conservationist Elizabeth Sanford



Except in the case of the bone finds from the Iron Age reservoir in Area B.1, most of the bone finds came from mixed deposits, i.e., deposits containing pottery from more than one single period, the latest period represented being the one used for assigning a date to the locus or stratum. Because of this situation, the earliest strata, those from the Iron Age, have perhaps the greatest integrity in terms of how representative the bone data are of what was deposited during that period. Unfortunately, however, during the 1976 season Iron Age deposits were not very productive in terms of bone finds when compared to earlier seasons, hence the statistical data from that period are based on a comparatively small sample.

To these limitations must be added those resulting from taphonomic processes, i.e., those physical, chemical and biological agencies whereby skeletal remains are normally disintegrated in nature (Lyman 1982). To begin with, after the butchered parts of food animals were discarded, dogs and other carnivorous wild beasts quickly descended upon them, consuming the vast majority of what was discarded. What was not thus destroyed, such as the hardest parts of the skeleton, was subjected, in the vicinity of people, to further destruction through being shuffled about. To this add the alternating temperatures of night and day and the leaching action of rains, and the fact that less than five percent of what was once discarded actually stood a chance of being preserved for posterity should come as no surprise (LaBianca 1978a: 238).

The fact that such a large quantity of well-preserved fragments was found at Tell Hesban is largely attributable to the protective environments into which most of what had been discarded had been deposited, namely into the deep reservoir in Area B and into numerous cisterns and other subterranean installations inaccessible to scavengers and protective against destruction by the other agencies mentioned above (cf. Meadow 1978). The presence of donkeys, horses, and other *unclean* species, including certain wild carnivorous animals in the bone sample is attributable, no doubt, to dogs having hauled the bones into the villages from the surrounding fields, although there is some evidence that equines might have been consumed by the ancient inhabitants of Tell Hesban (Boessneck and von den Driesch 1978a, 1978b).

Two doctoral candidates at the Institut für Palaeoanatomie, Domestikationsforschung und

Geschichte der Tiermedizin in Munich, Germany, assisted Drs. Boessneck and von den Driesch with analysis of the bone data in their hands. Thus, as noted, the 18,620 remains of domestic mammals were studied by Detlev Weiler (1981) while the 2,379 chicken bones were examined by Herman Lindner (1979). Also, as noted earlier, the 749 fish bones were identified and analyzed by Johannes Lepiksaar of the Naturhistoriska Museet in Sweden.

In this study, inferences regarding the composition of pasture animals (namely cattle, sheep, goat, pig, camel, horse, and donkey) are based on raw counts of bone fragments of individual species from each stratum. Inferences regarding diet changes, on the other hand, are based on total weight (in grams) of bone fragments of individual species from each stratum. No attempt was made to determine, in the case of principal domestic species, the minimum number of individuals (MNI) present in each stratum (cf. Chaplin 1971: 55-71; von den Driesch and Boessneck forthcoming).

In order to obtain an idea of the rate at which animal bone fragments were added to each stratum throughout antiquity, accumulation rates were computed. Such rates were computed by dividing the total weight (weight accumulation rate) and the total number of bones (fragment accumulation rate) of the principal domestic animals (sheep, goat, cattle, horse, donkey, camel, swine) from a given stratum into the total number of years spanned by that stratum.

Carbonized Seeds

In the present study we have relied primarily on Gilliland's (1986) analysis for information about carbonized seeds. After collection by means of judgment sampling procedures from soil and/or ash loci excavated during the 1976 and 1978 field seasons, the carbonized specimens were separated from the soil by means of flotation in water (pls. 4.14, 4.15; see Crawford, LaBianca, and Stewart 1976). A total of 891 carbonized samples were identified (Iron Age = 53; Hellenistic Period = 295; Roman Period = 55; Byzantine Period = 95; Islamic Period = 393). These included three types of cereals (oats, barley, and wheat), four types of legumes (lentils, peas, bitter vetch, and broad beans), olives, and grapes. Given the procedure whereby these palaeobotanical specimens were collected and their limited representation in each

Plate 4.10 Muhammad Tawfik, Asta Sakala LaBianca, and author cleaning animal bones outside the "bone tent" on Tell Hesban

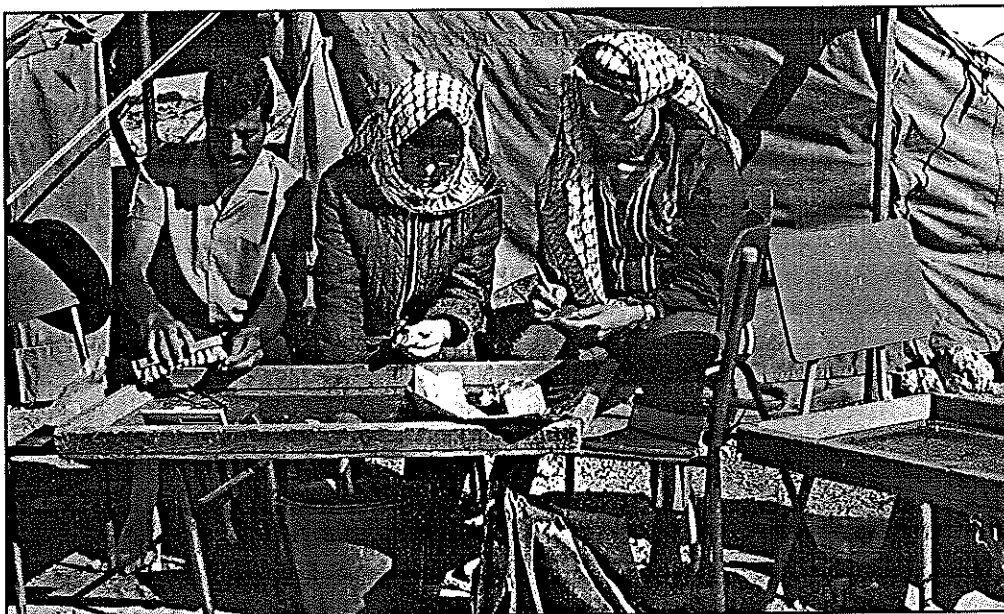


Plate 4.11 Joachim Boessneck and Angela von den Driesch, zooarchaeologists, analyzing animal bones

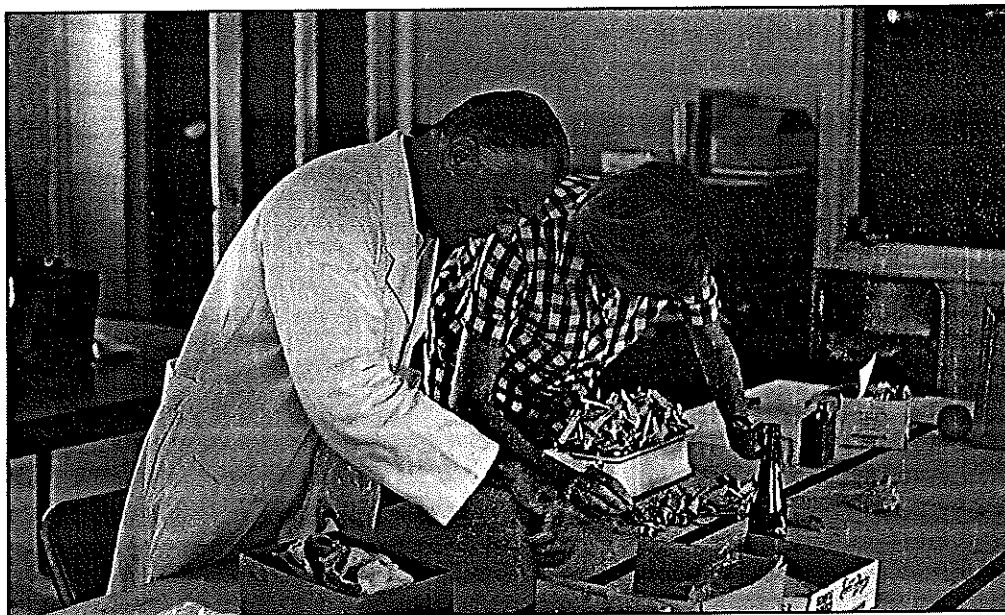


Plate 4.12 Robert Little, physical anthropologist, recording a human bone

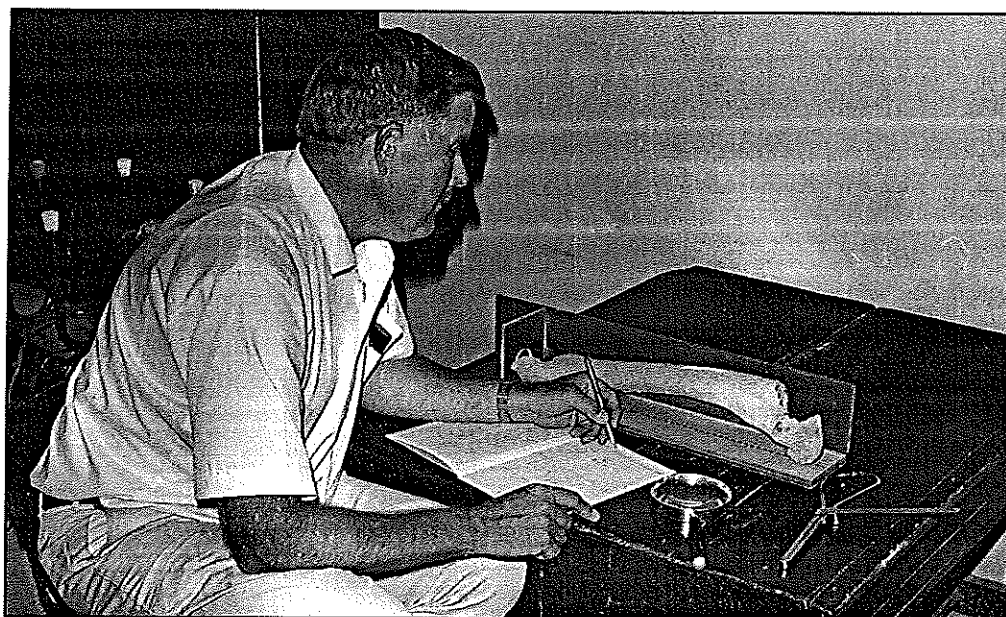


Plate 4.13 Mansef remains photographed in the course of taphonomic investigations in 1974

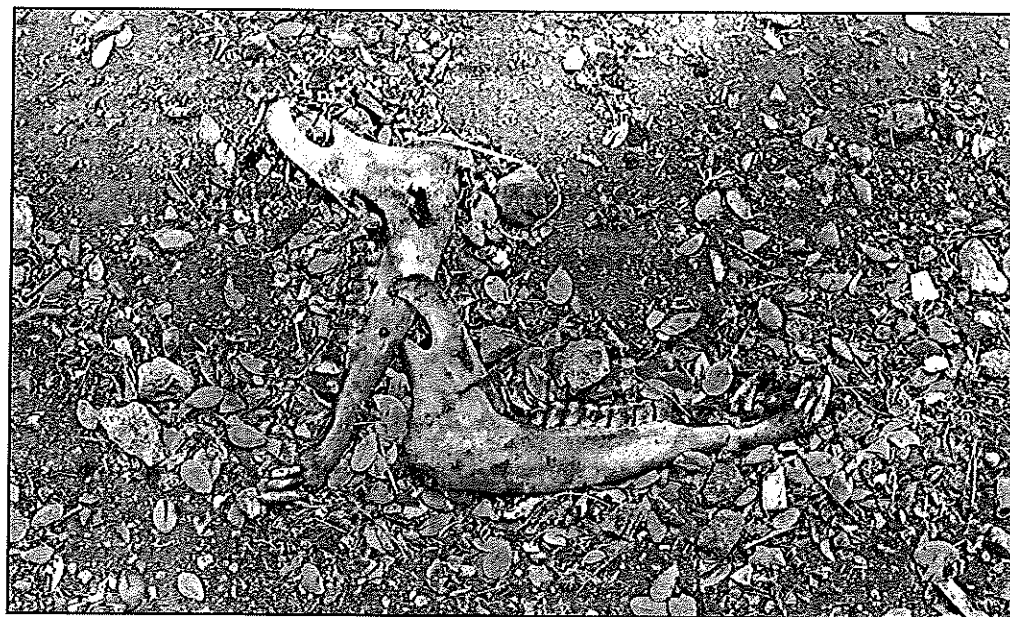


Plate 4.14 Larry Herr (left) and author setting up flotation apparatus; Hal James, geologist, looking on

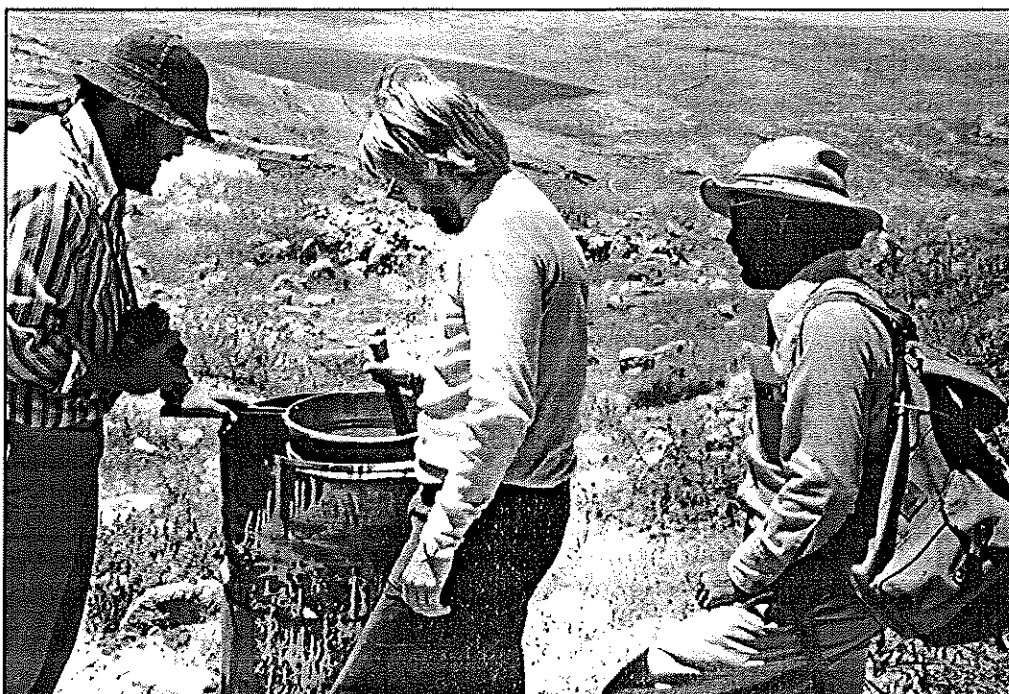
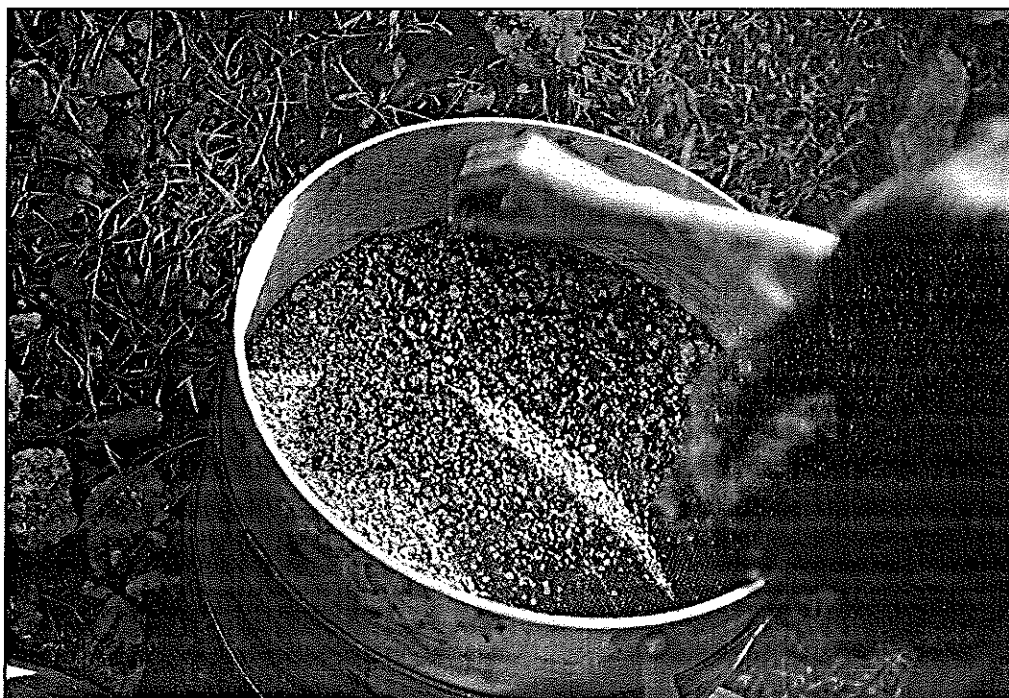


Plate 4.15 Patricia Crawford, ethnobotanist, examining flotation sample



individual stratum, the most reliable statement that can be made is that a given cultigen either was or was not present during a given period (cf. Renfrew 1973). Although numerical information about the composition of the different species found during various periods is presented, this information must be regarded as suggestive rather than conclusive. Such information has been utilized here as a secondary line of evidence in reconstructing environmental, landuse and dietary conditions.

Archaeological Survey Findings

The archaeological survey which was carried out within a radius of approximately 10 km of Tell Hesban resulted in 155 sites being mapped and described (fig. 4.3). The sampling method used was that of judgment sampling (cf. Knudson 1978: 117), whereby sites were found as a result of judgments made by members of the survey team rather than by means of random sampling techniques. Some of the factors which determined the precise limits of the territory surveyed and where the survey team focused their energies were discussed in Chapter One (The Project Area).

Although the definition of *site* offered by Ibach (1976: 119; cf. Redman 1973; Ammerman 1981; Schiffer, Sullivan, and Klinger 1978) is "any significant artifact or group of artifacts in close proximity to one another," the primary emphasis of the survey was oriented toward the discovery and documentation of as many archaeological tells and ruins as could be found within the project area (cf. Schiffer *et al.* 1978). Thus, observations which were made at each site tended to concentrate on information such as the size of the site (very small, small, medium, large, major tell), observable ruins (vaults and barrel roofs, pillars, building stones, wall, perimeter wall, tomb, cistern, reservoir, rectangular building, cave, tower, circular structure, wine press, foundation, and so on), topographic location (on a natural hill, near wadi, on a steep slope, etc.), and pottery (Iron I, Byzantine, possible Early Roman body sherds, etc.). No attempt was made to specify whether the site could have been an ancient village, farmstead, or campsite.

Extensive study was undertaken of these site descriptions and of the maps which had been prepared of sites from each major historical period in order to convert this information into data about ancient food system conditions. Our study involved

examination of changes over time in the distribution of these sites within the project area, of their topographic features and agricultural hinterlands, and of the finds identified at each of them by the survey team. As a result of this undertaking a number of patterns could be identified which contributed significantly to our understanding of changes over time in settlement, landuse, and operational conditions within the project area.

For example, it was possible to determine that a large number of these sites had, during certain periods, served as farmsteads, judging from their location on the edges of fertile agricultural valleys or plains and the presence in the immediate vicinity of each of two or more finds suggestive of an agricultural operation, such as the ruins of at least one watchtower, one or more rectangular buildings, cisterns, terraces, wine presses, caves, family tombs, and a perimeter wall. In other instances sherd scatters were reported in the vicinity of caves or springs. As these showed no signs of buildings or other permanent facilities, and given the fact that most of them were discovered in well-watered locations in the western descent, they were determined to be remains of ancient temporary campsites.

While we recognize that in some instances our identification of a particular site as a farmstead or a campsite may, upon future field inspection, turn out not to be correct, we should point out that where the data seemed too limited to be certain, we applied the *a priori principle* mentioned earlier. In other words, where there was not sufficient data provided to suggest a function for a particular site other than a farmstead or a campsite, we felt justified in treating it, for the purposes of our analysis, as one or the other of these.

Ecological Survey Findings

The various studies mentioned in Chapter One which dealt with the local climate, hydrology, geology, soils, plants, and animals were fundamental to three aspects of this study of the food system. First, they served as a basis for our understanding of the hydrological conditions, the indigenous plant and animal communities, and the successional patterns which prevail within the project area today. Second, this understanding, in turn, served as a basis for our attempts to reconstruct ancient environmental conditions given the information on hand regarding species of plants and animals in existence

Plate 4.16 Robert Ibach and survey team members Douglas Waterhouse and Charlene Hogsten

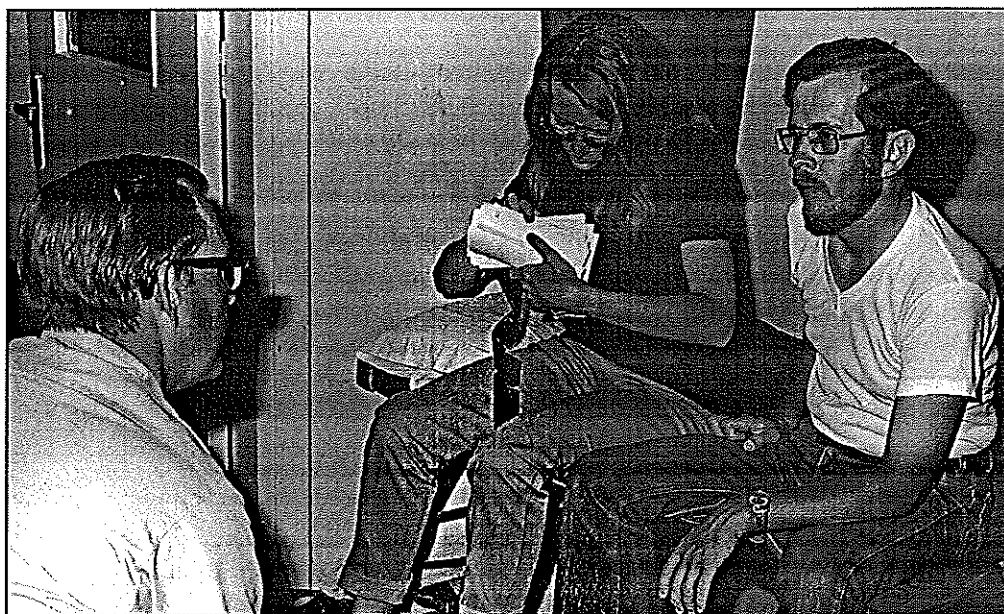


Fig. 4.3 Original Hesban Survey area (after Ibach 1987)

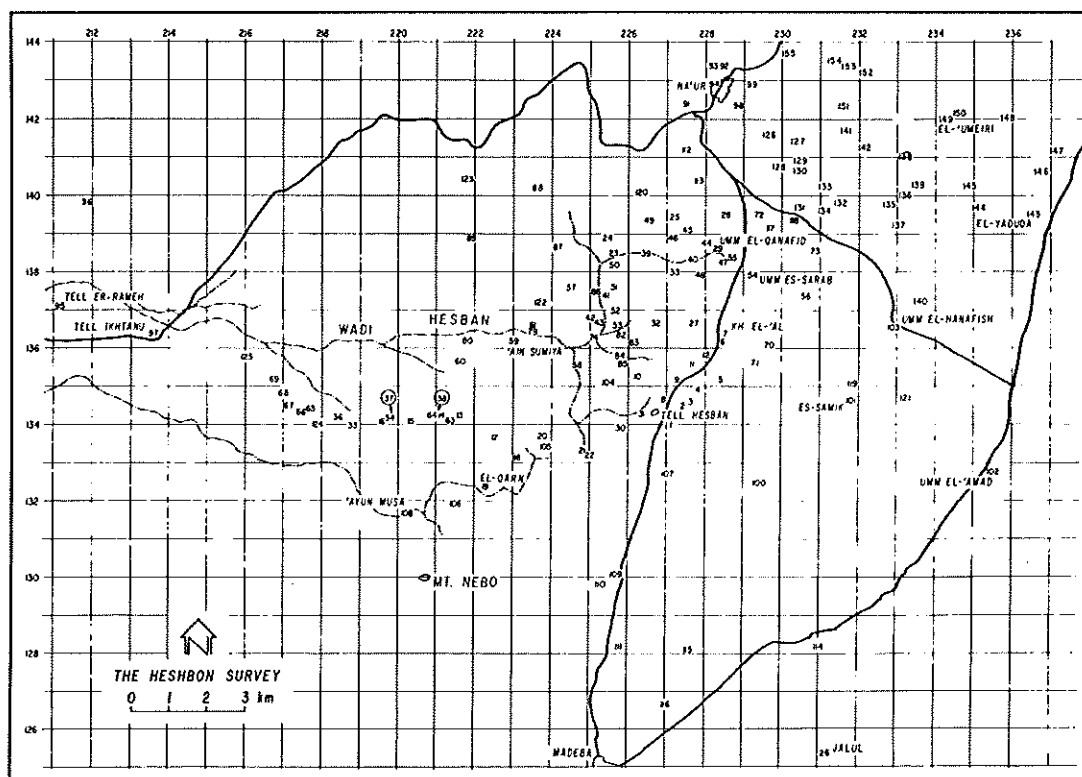


Plate 4.17 Geologist Hal James examining a lithic specimen



Plate 4.18 Robin Brown taking wind speed measurements



at various points in time. Third, they formed a basis for our attempts to understand the project area settlement pattern at various points in time insofar as this pattern, as we have seen already, was greatly influenced by proximity to sources of water and fertile agricultural soils (Evans 1978; Butzer 1982; Vita-Finzi 1978).

Ethnoarchaeological Findings

As was discussed in Chapter Three, the most important way in which our ethnoarchaeological research aided our efforts to reconstruct ancient food system conditions was in enabling us to become more intimately acquainted with its workings at a particularly accessible period in time, namely the recent past (cf. Binford 1983). This heightened familiarity, in turn, greatly facilitated our efforts to piece together, from the multiple lines of fragmentary archaeological evidence discussed above, various food system conditions and configurations which prevailed during the successive periods studied. Thus, rather than serving as a basis for direct analogy with the present, this information acquainted us, in a heuristic sense, with certain basic operational principles of the local food system.

Examples of some of these would include our heightened understanding of the fundamental fluidity of social structure in the Middle East, of sedentarization and nomadization as ubiquitous responses to changing social and physical environment, of the relationship between investment in permanent facilities and extent of population mobility, of the connection between species of animals produced and landuse conditions, of the association between types of crops produced and risk of plunderings by others, of the link between intensification of agricultural production and urban interest, and so on. Thus, whereas insights such as these aided in coming up with possible hypotheses to use in making sense out of the archaeological data, exactly what shape transhumance would have taken, for example, during the Byzantine Period, remained a matter to be determined by the available data rather than a supposition based merely on analogy with the present.

Explorers' Accounts

Accounts of ruins and other archaeological findings provided by 19th and early 20th century

explorers who visited project area sites were relied upon to flesh out the findings of the Hesban Survey (cf. Binford 1983: 19-30). As these accounts were based on surveys carried out before the project area became intensively settled as it is today, they contain descriptions of many sites which today have been obscured by modern building activity and landuse practices. The one major limitation of most of this information, however, is that the temporal framework is very vague because most of these explorers did not have the benefit of knowing about pottery dating techniques. Nevertheless, thanks to the acquaintance of individuals like Tristram and Conder with Greco-Roman and Islamic architecture and alphabets, a large number of ruins dating to these eras were identified as such in their accounts. The information supplied by these sources aided primarily in our reconstruction of past settlement, landuse, and operational conditions.

Secondary Sources

In order to relate developments taking place within the project area to pertinent developments occurring outside this limited region, a number of books and articles were consulted, most of them authored by historians and/or archaeologists. As a general rule, those secondary sources were sought and utilized which offered specific information regarding daily-life conditions in antiquity (as opposed to those primarily concerned with political conditions) and which made specific reference to such conditions in Palestine and especially in Transjordan. It must be acknowledged, however, that it is likely that certain pertinent sources might exist, particularly in non-English languages, which could have been consulted had time and money not been a concern. It is hoped that as this project continues any such gaps will gradually be closed.

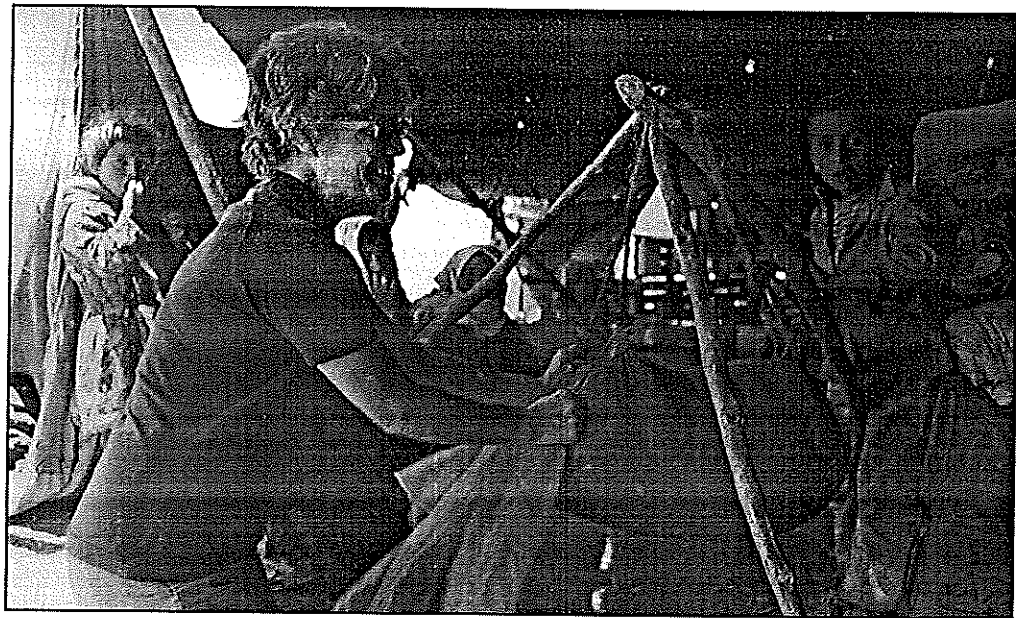
Relative Importance of Various Lines of Information

Although the reconstructions of food system conditions and configurations offered in the subsequent chapters rely on all of the above lines of information, certain ones of them can be singled out as having been more extensively exploited than others for this purpose. In terms of extent of time and energy expended in analysis, therefore, the

Plate 4.19 Asta Sakala LaBianca (fourth from left) with Palestinian women



Plate 4.20 Del Downing churning milk



following categorization provides a rough idea of the contribution of each of the ten lines of information to this study: Extensively studied and utilized were the ethnoarchaeological findings, animal bone finds, and archaeological survey finds. Moderately utilized were the ecological survey findings, archaeological stratum findings, explorers' accounts, and secondary sources. Least utilized were the ceramic artifact information (largely because very little except pottery readings was on hand), the registered small finds information (due to time limitations), and the palaeobotanical information (because of the scarcity of available data).

From Food System Conditions to Food System Configurations

Thus far I have described the procedures employed in converting the various types of information generated by the Heshbon Expedition into data relevant to ascertaining food system conditions. Specifically I've described how environmental conditions were ascertained on the basis of animal bone finds, palaeobotanical finds, and ecological survey finds; how settlement conditions were ascertained from animal bone finds, archaeological stratum descriptions, archaeological survey finds, and explorers' accounts; how landuse conditions were ascertained from animal bone finds, palaeobotanical finds, and archaeological survey finds; how operational conditions were ascertained from archaeological stratum descriptions, registered small finds, and explorers' accounts; and how dietary conditions were ascertained from animal bone finds and the palaeobotanical finds. Throughout the process of identifying these sources of data we were guided by insights derived from our ethnoarchaeological research.

The final step in the process of reconstructing ancient food system configurations was the task of distinguishing between successive ones on the basis of what we had learned about the changing states of the five food system conditions. To begin with, it was necessary to put forth an hypothesis distinguishing between a minimum of three possible configurations of food systems conditions (see fig. 4.4). This hypothesis owes its origin, in part, to Smith and Hill's (1975) proposals regarding energy flow through agroecosystems, which distinguishes between differences in intensity of human management in local ecosystems; and, in part, to insights

gained from the ethnoarchaeological research presented in the previous chapter. Three possible configurations of food system conditions were posited by this hypothesis.

A *low intensity configuration* which is characterized by high diversity of naturally occurring plant and animal species; high seasonal variation in location and intensity of human population due to migration; prevalence of pastoral pursuits and minimal disturbance of soils due to cultivation; prevalence of portable or seasonally abandoned operational facilities; prevalence of a subsistence diet derived from animal by-products, fruits, and grains in season, hunting, and gathering.

A *medium intensity configuration* which is characterized by a moderate diversity of naturally occurring plant and animal species; moderate seasonal variation in location and intensity of human population due to an increased number of permanently settled households; prevalence of field crop pursuits and a moderate disturbance of soils due to cultivation, especially in fertile plains and valleys; prevalence of small-scale water and soil management technologies, fortified farmsteads and villages and extensive utilization of cattle for plowing; prevalence of a subsistence diet derived primarily from field crops, but supplemented by produce resulting from limited gardening, orcharding, and flocks of sheep, goats, and poultry.

A *high intensity configuration* which is characterized by a low diversity of naturally occurring plant and animal species; minimal seasonal variation in location and intensity of human population due to large numbers of permanently settled households; prevalence of field crop pursuits in combination with extensive gardening and orcharding, the latter being especially important in hilly terrain; prevalence of large-scale water and soil management technologies, food processing and storage installations, transportation facilities, markets and urban centers, and extensive utilization of mules and horses for plowing; prevalence, especially in urban areas and to a lesser degree in rural areas, of a diet consisting of greater variety and quantity of exotic items, fruits, and vegetables due to delocalization of food supply by means of long-distance trade.

What this hypothesis provided was a means for arriving at an initial model of the configuration which prevailed during each of the successive periods for which data about food system conditions

Fig. 4.4 Three hypothesized configurations of food system conditions

A low Intensity configuration is characterized by:

- high diversity of naturally occurring plant and animal species;
- high seasonal variation in location and intensity of human population due to migration;
- prevalence of pastoral pursuits and minimal disturbance of soils due to cultivation;
- prevalence of portable or seasonally abandoned operational facilities; and
- prevalence of a subsistence diet derived from animal by-products, fruits, and grains in season, hunting, and gathering.

A medium Intensity configuration is characterized by:

- moderate diversity of naturally occurring plant and animal species;
- moderate seasonal variation in location and intensity of human population due to an increased number of permanently settled households;
- prevalence of field crop pursuits and a moderate disturbance of soils due to cultivation, especially in fertile plains and valleys;
- prevalence of small-scale water and soil management technologies, fortified farmsteads and villages and extensive utilization of cattle for plowing; and
- prevalence of a subsistence diet derived primarily from field crops, but supplemented by produce resulting from limited gardening, orcharding, and flocks of sheep, goats, and poultry.

A high Intensity configuration is characterized by:

- low diversity of naturally occurring plant and animal species;
- minimal seasonal variation in location and intensity of human population due to large numbers of permanently settled households;
- prevalence of field crop pursuits in combination with extensive gardening and orcharding, the latter being especially important in hilly terrain;
- prevalence of large-scale water and soil management technologies, food processing and storage installations, transportation facilities, markets and urban centers, and extensive utilization of mules and horses for plowing; and
- prevalence, especially in urban areas and to a lesser degree in rural areas, of a diet consisting of greater variety and quantity of exotic items, fruits, and vegetables due to delocalization of food supply by means of long-distance trade.

were on hand. In other words, on the basis of comparison of the data for a given period with each of these three models, a first approximation of the prevailing food system configuration could be proposed for each of the successive periods being investigated. Thus, a particular period's configuration would be characterized as being either low, medium, or high in terms of one of these models (cf. LaBianca 1984).

Next followed the task of refining the model initially utilized to represent a particular period as extensively as was permitted by the available evidence. In the case of some periods this sometimes led to an intermediate configuration being proposed such as low-to-medium or medium-to-high. In all cases it led to many additional details being introduced into the configuration in order to better characterize the salient features of the period in question. In this manner those aspects of the food system configuration which appeared to be unique to a particular period could be brought into focus while at the same time a sense was preserved of those aspects which recurred during periods initially represented by the same basic model.

After each of the successive historical periods had been examined and, in turn, represented by means of one or the other of these three models, changes became apparent in terms of the food system configurations which prevailed at different points in time. When the change was in the direction of intensification of the food system (increased management of the natural environment), the process of sedentarization was assumed to have occurred at a faster rate than nomadization. When,

on the contrary, change was in the direction of abatement (decreased management of the natural environment), the process of nomadization was assumed to have occurred at a faster rate than sedentarization. That these two processes have historically been simultaneous rather than exclusive of each other in occurrence is a supposition which has its basis both in the ethnoarchaeological materials which preceded this chapter and in the archaeological chapters which follow.

Between ca. 1500 B.C. and the present century, the project area food system underwent three major cycles of intensification and abatement involving a *pumping-up* period during which the process of sedentarization gradually gained momentum and prevailed, and a *letting-down* period during which the process of nomadization gradually gained momentum and prevailed. The first of these macrocycles took place between the 15th and the 5th centuries B.C., the second between the 4th century B.C. and the 7th century A.D. and the third between the 8th and 19th centuries A.D. In the following three chapters, each of these cycles is examined respectively.

Endnote

¹The dates assigned to strata and periods in this volume are those found in Mitchel 1980, except where sociopolitical discussions are based on historical events. These dates should not be regarded as being the final word on dating of strata and periods from this site and survey territory. More authoritative, in this regard, will be the volume dealing specifically with the pottery from Tell Hesban and vicinity (volume 11) which is being prepared by James Sauer.