The Archaeology of Jordan and Other Studies

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The Evolution of a Research Project

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I

The purpose of this essay is to describe the process whereby a research project—which had as its initial objective the study and analysis of animal bones excavated at an archaeological site in Jordan—has been transformed into an extensive cultural ecological inquiry aimed at discovering the processes whereby the past and present inhabitants of the same site develop(ed) and maintain(ed) their particular arrangements for exploiting animal resources. The evolution of this project, between 1971 and 1975, will be described relative to three successive stages of development. The three stages illustrate how an initial preoccupation with the analysis of animal bone data generated an intuitively perceived need to extend the project to the study of the environmental and anthropological contexts of animal exploitation, and finally, how these studies make imperative the formulation of a research design. But first, a few words about Tell Ḫesbān, the village Ḫesbān, and the Andrews University Heshbon Expedition are in order.

Since 1968 four seasons of archaeological excavations have been carried out at Tell Ḫesbān, biblical Heshbon, located at the edge of the rolling Moabite plain some 26 road kilometers southwest of Amman, Jordan's capital city (Boraas and Horn 1969:97). The site, which is well known from literary sources of antiquity (Vyhmeister 1968), was chosen for archaeological investigation because it looked as if it could produce data relevant to questions about the early history of Jordan and the possible conquest and later settlement of Israelis in this region (Boraas and Horn 1969:99-103). The results of three seasons of excavations have already been published (Boraas and Horn 1969; 1973; 1975). The excavation of seven areas on and about the acropolis and in an ancient cemetery has unearthed the following: extensive building remains and numerous cisterns of the Umayyad (A.D. 661-750), Abbasid (A.D. 750-969), and Ayubid/Mam-luk (A.D. 1174-1516) periods; tombs, a kiln, and a large church
complex of the Byzantine period (A.D. 324-640); defense walls with foundations dug to bedrock, tombs, and several cisterns dating from the Roman period (63 B.C.-A.D. 324); in addition to various Late Hellenistic (198-63 B.C.), and Iron Age/Persian (ca. 1200-500 B.C.) remains.

Adjacent to the archaeological site named Tell Ḥesbān is a modern Arab village named Ḥesbān. The modern village—which has an estimated population of 800—is inhabited by five major families (or sīhs), each occupying their sector of the village. The villagers are for the most part settled nomads who have been existing on livestock and cereal farming since the turn of the century. The village has been the subject of ethnographic inquiries by the author since 1973. In this paper, the name of the modern village, Ḥesbān, will be used to designate the locality in which all three places—biblical Heshbon, Tell Ḥesbān, and the Arab village Ḥesbān—are located.

The excavations at Tell Ḥesbān have typically involved a large number of participants. In the summer of 1974 (the most recent season), about 75 staff members and 150 local Arab workmen participated. The foreign staff consisted of the Advisor, Dr. Siegfried H. Horn of Andrews University; the Director, Dr. Lawrence T. Geraty of Andrews University; the Chief Stratigrapher and Coordinator of Specialists, Dr. Roger S. Boraas of Upsala College; the Chief Ceramicist, Dr. James A. Sauer of the American Center for Oriental Research in Amman; six area supervisors; four architect-surveyors; four photographers; one physical anthropologist and one socio-cultural anthropologist (and zooarchaeologist) with six assistants; two geologists; two pottery registrars; an object registrar; and 32 square supervisors.

II

The first stage in the evolution of the author’s research project had as its primary objective the study and analysis of the animal bones collected by the archaeologists at Ḥesbān, thus my initial role with the Heshbon Expedition was to be in charge of the "zoological operation."

Elsewhere I have discussed the processes whereby animal remains were collected—the nature of the sample, personnel, equipment, and the procedure whereby the bone samples are constituted (1973a:20-24)—and the technique for describing, recording, storing, and retrieving (using the computer) the bone data (1975:2-5). Before discussing some of the results which our initial zooarchaeological studies yielded, however, a brief summary of the kinds of informa-

tion typically yielded by animal remains is in order. (As the subsequent twelve categories of information are described, it must be remembered that the problems of data control and sample reliability are considerable in zooarchaeology, and that even under the most ideal circumstances—when the zooarchaeological data permit extensive and reliable estimates—caution is always necessary when drawing conclusions.)

1. The kinds of domestic and wild animals exploited, and sometimes the size and composition of herds, can be estimated from identified bone fragments.
2. It is sometimes possible to estimate the history of certain species from careful osteological analysis of their individual skeletal parts.
3. The physical size of the animals can sometimes be estimated from measurements of certain bone fragments, such as measurements of the width of metapodials at the epiphysis.
4. The sex of the animals can usually be determined only from well preserved pelvis, scapula, or certain skull fragments.
5. The age of the animals at the time of death can sometimes be estimated from an analysis of the state of the epiphysial unions of the bone fragments.
6. Butchering and meat cutting practices can sometimes be deduced from the study of fracture types, cut marks, etc., observed on individual bone fragments.
7. Meat processing, i.e., whether the flesh was cooked or roasted, can sometimes be judged from the color and density of the bone fragments.
8. Carcass utilization can sometimes be estimated from analyzing the recovery rates and the information available on butchering practices, meat-cutting practices, and meat-processing practices.
9. The relative importance of hunting versus livestock keeping can sometimes be estimated from analysis of distribution of the various animals constituting the faunal assemblage from a certain period.
10. Animal pathology can sometimes be deduced from abnormal lesions or growths on bone fragments.
11. Post-depositional effects can sometimes be estimated by analyzing the physical condition of the bone fragments.
12. The various activity areas of a particular settlement can sometimes be estimated from analyzing the recovery rates of different bone fragments.

By employing the foregoing techniques, it was possible to reconstruct some characteristics relative to animal exploitation by the ancient inhabitants of Tell Ḥesbān. Thus, a preliminary study of 2,838 of the identifiable bones recovered during the summer of 1971 at Tell Ḥesbān enabled the following preliminary findings: Domestic animals make up the majority of the identified fauna (95%). Sheep and goats were the primary subsistence animals during all periods of occupation. Cattle, even though few in number, appear to have been the second most important source of flesh food. Other domestic animals present in most periods of occupation are camel, horse, donkey, pig, cat, and dog. It appears that donkey was generally
more common than either horse or camel, and that pigs, usually very young, were mostly consumed during the Byzantine period.

Gazelle, partridge, catfish, and parrot fish were the most popular game. Other animals which may have contributed to the diet include porcupine, mole-rat, hare, rabbit, crow, raven, coot, bustard, ostrich, and mackerel fish (LaBianca 1973a:133-144).

Detailed studies of animal bones from the Ayyubid/Mamluk period and the Iron Age period yielded additional information: Game animals (especially gazelle, pigeon, and bustard) constituted a larger part of the diet during the Ayyubid/Mamluk periods, however, camel, horse, and donkey appear to have been more important in the Iron Age. Whereas no trace of domestic chicken was found in the Iron Age, an abundance of chicken bones turned up in the Ayyubid/Mamluk period. A study of 701 bones of sheep and goats from these two periods resulted in the following findings: (1) the recovery rates of bones from the Ayyubid/Mamluk period were greater than for the Iron Age; (2) Meat-rich bones significantly outnumbered meat-poor bones in both periods. The percentage of meat-rich bones was higher for the Ayyubid/Mamluk period than for the Iron Age; (3) hindlimb fragments from the Ayyubid/Mamluk period showed twice as many butchering marks as the same fragments from the Iron Age; (4) sheep remains were better represented than goat remains for both periods. The Ayyubid/Mamluk period showed a higher ratio of sheep to goats than the Iron Age; (5) female animal remains far outnumbered male animal remains in both periods; and (6) sheep and goat remains from the Ayyubid/Mamluk period showed a shorter life expectancy rate than their remains from the Iron Age (LaBianca 1973b:29-46).

III

It became apparent to me--while preparing the foregoing findings for publication--that these data seemed rather meaningless and unimportant when presented apart from an environmental and anthropological context. The faunal assemblage--comprising 36 species including a dozen domestic animals and two dozen wild mammals, birds, reptiles, and fish--needed to be studied in relation to the zoogeography and natural environment constituting their habitat. The domestic animals--especially the food animals--needed to be studied in relation to such anthropological concerns as subsistence economics, herd-management practices, butchering and meat-cutting practices, carcass utilization practices, etc.

Other problems requiring study emerged as well. For example, what were the processes which determined the deposition of the animal bones in antiquity? What possible effect might the different physical contexts of the bones have had on what was recovered? Logistical problems relative to collecting and processing the bones emerged as well, but these have been discussed elsewhere (LaBianca 1975).

The second stage in the evolution of this research project was a response to this intuitively perceived need to extend the project to include environmental and ethnographic inquiries. Despite not having achieved an explicit conceptual framework or methodology making possible the systematic coordination and integration of old and new studies, extended inquiries were embarked upon. These have been described here in some detail because they afford an insight into the kinds of problems encountered in the early stages of the development of this project.

These extended inquiries had as its first objective to reconstruct from the literature--as far as this was possible--the environmental setting of Hesbān. The subsequent paragraphs summarize the result of nine months of searching in the libraries of the Museum of Comparative Zoology, the Gray Herbarium, the Geological Science Museum Library, and the Peabody Museum Library--all Harvard University libraries.

The area surrounding Hesbān has primarily terra-rosa type soils which are produced by the weathering, under Mediterranean conditions, of Cenomanian, Turonian, and Lower Senonian hard limestones and dolomites. The soil is rather fertile, even though the waterholding capacity and permeability of it are moderate.

Hesbān is situated in a climatic district with both Mediterranean and Irano-Turanian characteristics. This means that the precipitation would average about 300 millimeters annually, that rain falls only from November to March, and that the nights are usually cool by contrast with maximum daytime temperatures.

The phytogeography of the Hesbān region is characterized for the most part by Mediterranean flora. The vegetation climax is Mediterranean Maquis and forest types. Agriculture consists of dry-land farming usually based on non-irrigated winter and summer crops such as wheat, barley, millet, maize, lentils, beans, peas, and vetches.

The zoogeography of the region consists of a relatively higher percentage of Mediterranean species than is found in Palestine as a whole, and higher percentage of Irano-Turanian species than Saharo-Sindian species (these findings have been described in detail elsewhere, LaBianca 1973b:8-19; see also the bibliography, pp. 63-73).
When these findings are compared to the results of the bone studies—the exclusive concern of the first stage—they seem too general, and hence, not very helpful to our understanding of animal exploitation at Ḥesbān. For example, the relationship of the faunal assemblage to the zoogeography of Ḥesbān, as it could be reconstructed from the literature, is still unclear. This emphasized in my mind the need for environmental data collected in the field.

Unfortunately, little in the way of systematic collection of environmental data has been possible to date, even though some botanical specimens have been collected and are presently being studied. It should be emphasized, however, that a knowledge of the literature is useful as a background to field studies. Thus, the foregoing information about the setting of Ḥesbān—along with the extensive bibliography dealing with the Ḥesbān area and Jordan—is proving to be invaluable when specific problems emerge as a result of fieldwork.

Some progress was made toward understanding the relation between the animal bones and their cultural and physical contexts. By utilizing ethnoarchaeological observations of butchering and meat-cutting practices of the present-day villagers, it was possible to infer that during the Late Roman and Hellenistic period at Ḥesbān the animal carcass was butchered and cut in much the same way as it is today, that during both periods the animals were slaughtered within close proximity to the villagers’ dwellings, and that during both periods each family slaughtered and ate their own animals rather than having purchased the meat in the markets (LaBianca and LaBianca 1975). If future studies sustain these findings, it will become an important clue to the understanding of the food preparation practices of the ancient inhabitants of Ḥesbān.

Other kinds of cultural patterning reflected in the bones were studied as well. For example, differences between periods relative to butchering practices, herd composition, and life expectancy rates of animals have been explained elsewhere using the concept of herd management as an analytical tool (LaBianca 1973b:56-60).

Differences between periods were also studied relative to how bones were disposed of and how different post-depositional physical contexts might affect the preservation of bone fragments. For example, it was possible to show that bones from protected cistern deposits show much better recovery rates for thin-walled, cancellous bones and whole bones, than for bones from exposed deposits (LaBianca 1973b:54).

A variety of other ethnoarchaeological inquiries were embarked upon during this second stage of the project. Data dealing with such problems as the social organization of the present-day village—the physical arrangement of village houses and gardens, plant and animal enterprises, the agricultural technology and land use, culinary practices, etc.—have been assembled and are currently being prepared for publication. It is of special interest, relative to a subsequent contention of this paper, that in the present-day village, as in ancient times, the raising of sheep and goats is the most important animal enterprise; that, except for the pig, all the other domestic animals present in ancient times are also found in the present-day village; and that, to a large extent, these animals seem to be of the same relative importance to the subsistence economy of the present-day village as they were to the subsistence economies of the archaeological periods studied thus far. The implication of these observations will be discussed subsequently.

IV

Now that the process has been described whereby the author’s problem was transformed from that of zooarchaeology alone to one comprising environmental studies and ethnography, what is the conceptual framework which undergirds and unites these inquiries? What is the rationale which enables comparison of the present-day situation to the ancient situation? What is, in fact, the rationale which enables the making of inferences about cultural and environmental phenomena from mere animal bone fragments? How do the environmental, ethnographic, and zooarchaeological inquiries articulate with each other? These, and many other questions, constitute problems which have made imperative the formulation of a research design, i.e., a conceptual framework enabling a systematic analysis of each of these various problems in relation to an integrated whole. This task constitutes the objective of the third stage in the evolution of this research project.

It is my contention that a cultural ecological approach—which has as its central concern the study of "the way cultural systems adapt to their total environment . . . and the way the institutions of a given culture adapt or adjust to one another" (Kaplan and Manners 1972:75)—provides the kind of conceptual framework and methodology which is needed to formulate a research design capable of leading to the discovery of the processes whereby the inhabitants of Ḥesbān develop(ed) and maintain(ed) their particular arrangements for exploiting animal resources.

Anyone familiar with the recent literature dealing with the anthropology of the Middle East should not find this contention
indefensible. Cultural ecological approaches have seemingly dominated the scene of Middle Eastern anthropology. Thus Antoun (1972), Barth (1961), Marx (1967), Asad (1970:346-362), Flannery (1970:29-52), and Peters (1970:76-123) all employ—to varying degrees, but nevertheless consistently—cultural ecological concepts or approaches.

The author has found Steward's proposals regarding the concept and method of cultural ecology to be particularly valuable in approaching the questions stated above. It is Steward's concept of "cultural core—the constellation of features which are most closely related to subsistence activities and economic arrangements" (1968:165-166)—which makes his formulation of cultural ecology so useful as a methodological tool. The idea here is that whereas some features of culture "are determined to a greater extent by purely cultural-historical factors—by random innovations or by diffusion;" other features—especially those related to subsistence activities and economic arrangements—are determined primarily by environmental factors (Steward 1968:165-166). The degree to which, for example, social, political, and religious patterns are interdependent with the cultural core is a matter for empirical analysis. Thus, cultural ecology is not concerned with analyzing "the web of life for its own sake." Rather, only such cultural features as are affected by the adaptive process of a culture to its environment are the object of empirical investigation. The implication of this point is that the environment is not only permissive or prohibitive with respect to certain features, but "special local features" may require adaptations which constitute creative processes (1968:163,167).

From a methodological point of view then, "it makes a great deal of difference whether a community consists of hunters and gatherers who subsist independently by their own efforts or whether it is an outpost of a wealthy nation, which exploits local mineral wealth and is sustained by railroads, ships or airplanes" (1968:168). Clearly, the nature of the cultural core is determined by different factors in the two cases: in the former, mostly by environmental factors, and in the latter, "by productive arrangements which themselves have a long cultural history."

According to Steward, the method of cultural ecology entails three fundamental procedures (1968:168-170). The first, analyzing "the inter-relationship of exploitative or productive technology and environment," involves studying a considerable part of the material culture. For example, "weapons and instruments for hunting and fishing, containers for gathering and storing food" are among the subsistence devices one would need to study in primitive societies. Agriculture and herding techniques would be studied in more developed societies. Also, climate, topography, soils, hydrography, vegetational cover, and fauna are often crucial for understanding the core culture of both primitive and more advanced societies.

The second procedure, analyzing "the behavior patterns involved in the exploitation of a particular area by means of a particular technology," involves studying the limits imposed by a particular subsistence pattern on "the general mode of life of the people." For example, "hunting . . . may be either an individual or a collective project, and the nature of hunting societies is determined by culturally prescribed devices for collective hunting as well as by the species" (1969:169). If exploitative patterns can be empirically shown to depend upon facilities for transporting people to the source of supply or vice versa, then such features would naturally also have to be studied.

The third procedure "is to ascertain the extent to which the behavior patterns entailed in exploiting the environment affect other aspects of culture." To what extent, for example, may the social organization of a peasant village be determined by their subsistence activities? As Steward points out, this third procedure "requires a genuinely holistic approach, for if such factors as demography, settlement pattern, kinship structure, land tenure, land use, and other key cultural features are considered separately, their interrelationships to one another and to the environment cannot be grasped" (1968:170).

Cultural ecology, as a concept and method for approaching the aforesaid problems relative to the diachronic study of animal exploitation at Ḥesbán, is useful because it focuses attention on how cultural systems articulate with their total environments. Specifically, the local environment is introduced as an extracultural factor. As noted earlier, cultural adaptations are seen as resulting not exclusively from historical or cultural factors, but also from "extracultural factors," i.e., the natural environment or "habitat." Furthermore, some cultural features—especially those related to subsistence activities and economic arrangements, i.e., the core culture—are seen as articulating more closely with the local environment. As such, their development and maintenance are seen as being to a certain extent at least—the result of environmental factors constituting creative processes.

The cultural ecological approach then enables one to investigate the processes whereby the inhabitants of Ḥesbán develop(ed) and maintain(ed) their particular arrangements for exploiting animal
resources with reference to both historical and environmental factors. This approach also emphasizes the special relationship which exists between the exploitation of animal resources, i.e., an aspect of the core culture of Hesban, and the local environment. Thus the "core culture" at Hesban (i.e., the social, religious, and political arrangements), because of its greater dependence on historical factors, may have been substantially different during the various periods of occupation at Hesban; yet the "core culture" (i.e., subsistence and economic arrangements), because of its greater dependence on local environmental factors, is less likely to have differed substantially from one period to the next (assuming that the local environment has not changed substantially over the past 3,000 years). This point is exactly what our zooarchaeological findings to date suggest. As stated earlier: the animal enterprise of greatest importance in the present-day village of Hesban, sheep and goat husbandry, appears also to have been the most important animal enterprise during all previous periods of occupation at Tell Hesban. Furthermore, the consistency with which the other domestic animals (cattle, horse, donkey, camel, pig) are represented throughout the various periods of occupation at Hesban suggests that with respect to these animals also there has been continuity and relatively little change.

One of the important implications of recognizing continuity in the core culture of Hesban is that it lends credence to the use of ethnographic analogy, that is, a method "for inferring patterns of behavior and organizations of peoples who existed in the past" (Longacre 1974:51), as an approach to discovering the creative processes whereby arrangements for exploiting animal resources were developed and maintained at Hesban. It is true that a frequent criticism of ethnographic analogy is that it assumes "that we have nothing new to learn from the past" (Longacre 1974:54). This criticism may certainly be apropos when ethnographic analogy is used to reconstruct social, political, and religious arrangements in the past; since, as we have pointed out already, these arrangements—because of their greater dependence on historical factors—are likely to have been substantially altered from one period to another. In contrast to this, and as we have already argued, there appears, in fact, to be much continuity at Hesban relative to the exploitation of animal resources. This continuity, we have maintained, is the result of continuity at Hesban relative to the articulation of animal exploitation with the local environment, which we assume has not been fundamentally changed over the past 3,000 years. Ethnographic analogy, therefore, when employed as a means to reconstruct specific aspects of core culture, may after all be useful.

Ethnographic analogy involves using processual information about observed human behavior (ethnographic information) for reconstructing processes of the past from (archaeological) information about the results of human behavior. Thus, zooarchaeological data, which constitute results of human behavior, can be investigated with processual information about present-day processes relative to patterns of animal exploitation, and in this manner, the processes whereby the past inhabitants of Hesban developed and maintained their particular arrangements for exploiting animal resources can be apprehended.

But ethnography for the sake of ethnographic analogy is by no means its only purpose. Perhaps an even more basic reason for collecting ethnographic information is in order to establish the extent to which the subtle patterns observed in the zooarchaeological data from ancient times indeed reflect human behavior. In other words, ethnography is essential as a means for determining whether or not animal bone fragments mean anything at all relative to cultural patterning. To date, this is a relatively unexplored question in zooarchaeology.

In order to proceed with this question, we shall again return to the concept and method of cultural ecology. However, before we begin to explore this question, we shall first need to investigate the extent to which the animals themselves, and the arrangements for exploiting them, reflect cultural patterning. The methodological procedures of cultural ecology allow a systematic approach to this problem:

The first step is to analyze the interrelationship of exploitative or productive technology (livestock and crop enterprises) and the local environment at Hesban. This is the point at which the aforementioned ethnographic and environmental inquiries articulate. The object here is to ascertain the relationship between climate, topography, soils, hydro-geography, vegetational cover (land carrying capacity), and livestock and crop enterprises at Hesban.

The second step is to analyze the behavior patterns involved in the exploitation of the Hesban environment by means of these livestock and crop enterprises. What are the limits imposed by these enterprises on 'the general mode of life on the people?" What sort of cooperative arrangements are required? What sort of economic arrangements are necessary for carrying on these enterprises?

The third step is to analyze the extent to which the behavior patterns entailed in exploiting the environment affect other aspects of culture at Hesban. To what extent is the social organization of
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as to understand the extent to which cultural patterning is manifest in the skeletal remains of animals. As was stated above, the implication of this is that ethnography cannot merely be pursued as a handmaid to zooarchaeology so as to permit zooarchaeological analogy. Rather, it must be pursued in its own right and for its own sake.

The procedure for extending this ethnographic research should be in accordance with the methodological procedures of cultural ecology. Before this can be done, however, specific goals and methods for collecting and processing the relevant data will need to be delineated with greater detail in an operational research design. The present essay anticipates this research design by formulating the conceptual framework for integrating the many independent lines of inquiry which previously constituted the present research project. In so doing, it also invests with greater merit the various zooarchaeological, environmental, and ethnographic studies discussed and criticized in the first half of this essay, by incorporating them all in a cumulative research project.

The expansion of the ethnographic and environmental studies should be accompanied by further refinement of the zooarchaeological operation. Four seasons of zooarchaeological activity at Tell Ḥesbān, over a period of six years, have resulted in substantial progress relative to the analysis of zooarchaeological data. However, better techniques for ensuring data control and sampling reliability, and for processing the data, are still goals worth striving for in future seasons. The procedures for achieving these goals would also need to be delineated in the operational research design.²

²This essay was written and submitted for publication in 1976. It therefore represents views arrived at ten years ago. For an update on progress made during the intervening years, refer to the following publications: ADAJ 28:269-287; Studies in the History and Archaeology of Jordan II. Adnan Hadidi, ed. (Avon England: Bath Press, 1985); HESHBON I & II (forthcoming).
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