

Anthro Notes

National Museum of Natural History Bulletin for Teachers

Vol. 16 No. 2 Spring 1994

NEW PERSPECTIVES ON AGRICULTURAL ORIGINS IN THE ANCIENT NEAR EAST

Introduction

How can a heap of long buried, extremely fragmented animal bones help us better understand the origins of agriculture, perhaps the most significant turning point in the course of human history?

Agriculture, which anthropologists define as both the domestication of plants and animals, changed forever the evolution of human societies. While agriculture brought about unparalleled productivity and ever improving standards of living, it also led to swelling populations, widespread hunger, and irreversible environmental change. It should be no surprise, then, that the causes and consequences of the origins of agriculture, often called the Neolithic Revolution, are recurring topics of lively debate within the field of archeology.

What were the preconditions that led to the domestication of plants and animals? Why did people nearly 10,000 years ago first begin to experiment with crops and the rearing of livestock? When and why did these practices replace gathering wild resources and hunting game as the primary means for feeding people?

Early 20th Century Views

Theories explaining the causes and consequences of agriculture have been not only varied but frequently contradictory. In

the late 19th through the mid-20th century, many researchers viewed agriculture as a technological breakthrough, forever freeing humankind from a life on the margins, from a mean, brutish existence that relied on wits and luck for survival. Agriculture, in this view, brought with it an era of bounty, with people reaping a rich harvest of predictable and nutritious plants and animals. This ability expanded with each new technological refinement--the plow, draft animals, irrigation. Farmers' labors were seasonal, affording leisure time to invent labor saving technologies as well as cultural elaborations in the arts and sciences. Early agriculture was the first major watershed, setting the stage for the subsequent grand threshold of human achievement--the development of civilization.

Mid-20th Century Views

During the 1960s and 1970s, the world became increasingly concerned with scarcities of primary resources and overpopulation, with people demanding limits to growth. In this climate a very different picture emerged of the origins of agriculture. The life of the hunter-gatherer, past and present, no longer was described as one of hardship, privation, and ceaseless toil. Rather, anthropologists saw hunter-gatherers as "the original affluent society"--people with modest needs met by occasional hunting forays and sporadic collecting. Agriculture was viewed as a



EXPULSION FROM EDEN ?

kind of expulsion from Eden, brought about by the inevitable expansion of population beyond the capacity of hunter-gatherer strategies to satisfy basic needs. The price of the pre-Neolithic baby boom, the punishment for taking the first bite of the domesticated apple, was the farmer's life of hardship and toil.

In this view, growing crops and raising animals provided more food, but the food was less nutritious and less palatable than people had previously enjoyed. Agriculture accelerated the rate of population increase, resulting in more widespread hunger than the world had ever seen. The reduction in biological diversity accompanying the spread of agriculture undermined the stability of natural resources, paving the way for periodic, devastating ecological crises.

These two alternative visions of the origins of agriculture, as blessing or blight, serve as opposite poles of the debate. Researchers are discovering, however, that the story of the development of plant and animal domestication and the resultant food producing economies is far richer and more complex than either of these two views.

Earlier interpretations, for example, posited that all peoples throughout the Near East adopted food producing technologies quickly and completely, never looking back

to earlier days of hunting and gathering. The wide array of suitable plant and animal domesticates, the favorable local environmental conditions, and the human population dynamics may well explain a generally rapid embrace of food production as a more reliable subsistence strategy than hunting and gathering. But within the Near East, the domesticates and the timing of their adoption varied, with each region emphasizing different combinations of cereals and animals in varying rates and sequences. The Khabur Basin provides one case study illustrating the variation in human adaptation to the development of farming and herding.

The Khabur Basin of Ancient Mesopotamia

The Khabur Basin is nestled in the far northeastern corner of modern-day Syria, bordered by Turkey to the north and Iraq to the south and east. The northern Khabur Basin is dissected by the Khabur River and a number of streams (or wadis, as they are called in the Near East) fanning out across the basin. These wadis are often dry in the searing summer months. During the late fall through the spring, they carry seasonal rains and runoff from northern upland areas. These seasonal streams converge where the Khabur River begins its journey southward, eventually joining the Euphrates River. There is a steep north-south gradient of rainfall in the

Khabur Basin. In the far north, there is more than enough precipitation to support rain-fed, non-irrigation based agriculture, but rainfall levels decrease precipitously as you move southward, where rain-fed farming becomes an increasingly risky business.

Early Settlement in the Khabur Basin

Settlement in the Khabur Basin was sparse up until about 6,000 B.C. There are no sites known in the region before 14,000 B.C. and only two sites date between 14,000 and 10,000 B.C. The eighth millennium B.C. (8,000 to 7,000 B.C.) saw the introduction of farming and herding into the Basin. For almost 2,000 years a few small communities, located exclusively in the better-watered northern region, relied primarily on domestic resources: cereal grains, lentils, and pulses (pod bearing plants such as peas and beans), as well as sheep and goats, and later pigs and cattle. Then the northern steppe witnessed a substantial increase in settlement. A number of farming communities arose in the upper Khabur Basin, all of which produced a distinctive pottery, linking them to a Halafian cultural tradition that spread widely across Northern Mesopotamia.

The Halafian Period, named after Tell Halaf in the northern Khabur, is believed to have experienced a remarkable proliferation of rain-fed farm communities, an expansion of far flung trading networks, and, possibly, the development of more complex social organization. From what we know of the plant and animal remains recovered from Halafian sites in well-watered areas, these communities relied heavily on domestic crops and live-

stock, although a small amount of wild plants and animals were also gathered and hunted.

Umm Qseir

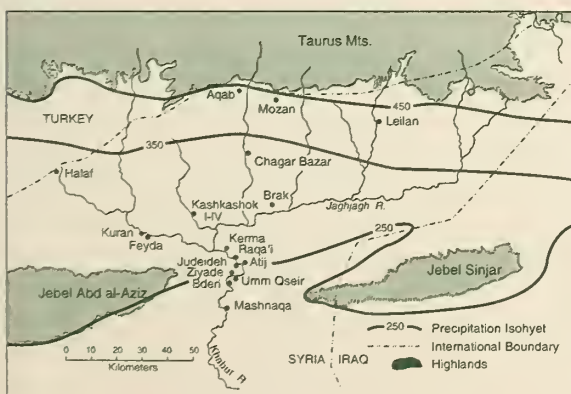
The first indication of population movement out of the northern steppe into the arid southern steppe comes from Halafian levels at the small site of Umm Qseir, situated just below the 10" (250 mm) rainfall boundary. Umm Qseir is located about 19 miles (30 km) away from the nearest contemporary site and is very small: no more than a quarter of an acre (1/10 hectare) in size. Excavators from Yale University found only ephemeral traces of architecture at Umm Qseir and essentially no tools used in grain harvesting and processing. The entire Halafian occupation of Umm Qseir seems to have lasted no more than 200 years, between 6,000 and 5,000 B.C., and the site was probably never occupied by more than two or three families. We originally thought this tiny Halafian outpost was a seasonal encampment, used by small groups who traveled with their flocks from established villages in the north to take advantage of the abundant southern spring grasses.

Animal Bone Analysis

Through extensive analysis of the plant and animal remains from Umm Qseir, we tested our first hypothesis that the site was a seasonal encampment of mobile herders or pastoralists. Our analysis demonstrated this hypothesis to be absolutely dead wrong!

Through the painstaking, sometimes frightfully dull study of thousands of broken bones and fragments of charred seeds, we uncovered clues to reconstruct the daily subsistence of people living in this tiny community in Mesopotamia between 6,000 and 5,000 B.C.; the clues told us much about the complexity of these people's yearly strategies to survive.

An average season of archaeological excavation in the Near East can yield upwards of 50,000 bones, each of which is of interest to the zooarchaeologist who specializes in studying animal bones. The



bone analysis requires an incredible amount of patience and a sharp eye for seeing patterns after thousands of observations have been recorded. Bones first have to be washed and dried, sorted, labeled, and coded for a variety of information: animal species, skeletal element, side, type of breakage, and so on. The zooarchaeologist makes these observations, often using skeletons of modern animals to help identify broken bone fragments.

The bones and teeth of an animal carry hidden clues to the age and season during which that animal was killed. Long bones (such as the femur or radius) fuse at certain known ages. If you find an unfused distal end of a sheep humerus, you know that that sheep was killed before it reached its first birthday. Like human children, mammals lose their baby teeth, and their adult teeth erupt at known ages. The rate at which teeth wear with use over time also is known for some animals as is the peak birth months.

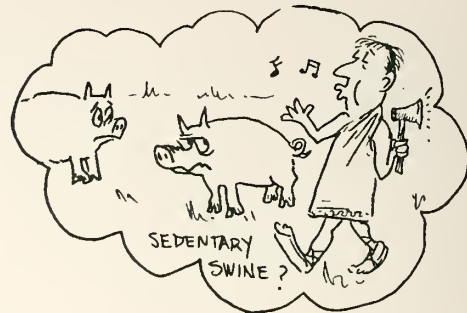
The zooarchaeologist uses this knowledge when analyzing bones to calculate the age, and, in some cases, the season in which an animal was killed. With a large enough sample of bones, an age profile of the flock and the primary seasons in which the animals were slaughtered can be identified. From this profile, a range of conclusions can be drawn about the relationship of humans to the animals with which they lived--both domestic and wild.

The Puzzle of Umm Qseir

Pigs Offer the First Clues

Was Umm Qseir a seasonal settlement for pastoral herders coming down from the North, or was it a year-round settlement? Domestic species utilized by residents of Umm Qseir in the 6th millennium (6,000-5,000 B.C.) consisted of sheep, goat, and pig, but no domestic cattle. The absence of the full range of Neolithic domesticates (sheep/goat, pig, and domestic cattle) at first supported the hypothesis that Umm Qseir was a site for pastoralists taking seasonal advantage of the lush late winter/early spring pasturage in the region.

However, pigs did not fit easily into this scenario. Pigs have neither the legs nor the temperament for long distance migration, and, though there are some instances of pig drives in the past, swine are not customarily associated with pastoralists in the Near East. In fact, pigs are usually taken as markers of a sedentary life style.



It was possible, however, that Halafian Umm Qseirians drove a pig or two down to the area each spring along with their domestic sheep and goats. Information on both the age and, especially, the season of death of the pigs consumed at Umm Qseir was necessary to resolve this question. Based on an examination of pig teeth from Umm Qseir, we knew the slaughter of swine at the site focused on animals between 6 to 18 months of age. This is a common culling (slaughter) pattern for domestic swine. Yet, although there is an emphasis on young pigs, the kill-off of swine at Umm Qseir was not confined to piglets. There were also older animals, in the 3 to 4+ year age range, indicative of the presence of quite elderly swine at Umm Qseir. Not just one or two pigs were brought to the site each season, but, rather, a viable breeding herd must have been present.

Strong seasonality in kill-off of pigs at Halafian Umm Qseir also took place. Slaughter of swine seems to have been most common from May to October, particularly from August through October. This period includes the arid summer months and the early rainy season--the leanest resource period in the region. Intensity of swine slaughter slackens in the months between November and April, the period of greatest bounty of plant and animal resources in the middle Khabur.

Sheep and Goats Offer Additional Clues

We tentatively concluded that pigs were present at Umm Qseir throughout the year and that at least some Umm Qseir residents lived here on a permanent basis. But did all the residents live here all year long? Perhaps just a few people resided here year round, eating pigs in the hard times, to be joined by pastoralists in the late winter/early spring, pasturing their sheep and goats. We needed to look carefully at the sheep and goat age and seasonality data to help give us the answer.

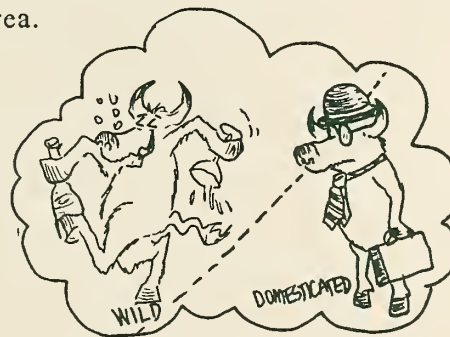
Sheep and goat age distributions indicate an emphasis on culling animals in the 1 to 2.5 year range. Once again the bones told us that both young lambs and kids and older sheep and goats were eaten at the site. Seasonality data indicate relatively low kill-off in the first six months after birth (from February to July), and a peak in slaughter of lambs and kids in the second six months (between August and January). In the following six month periods, mortality consistently slackens in the late winter/early spring months, and increases in the summer and fall. Once again, it is these months of hot, dry summer and sodden unproductive early rainy season that are the hardest on herds in the region today. This is the most likely season for kill-off of domestic sheep and goats from resident herds. It is, however, the least likely season for pastoralists to be here, since these are the hardest months in this region.

If these animal bones had been the result of nomadic pastoralist culling, they would have reflected a kill-off in the late winter/early spring, when flocks would have been brought to the southern region to feed on the luxuriant spring grasses of the steppe. In addition, there would be a virtual absence of animals in the more stressful dry summer/early winter months, when pastoralists with their herds would have headed north.

Wild Animal Clues

The biggest surprise from this collection of bones did not come from domestic animals, however, but from wild ones. Unlike

contemporary and earlier sites on the northern steppe--where domesticated animals are overwhelmingly the most commonly eaten in early farming villages--at Halafian Umm Qseir, bones of domestic animals comprise less than half of the bone sample. Wild species dominate! People were eating gazelle, wild ass, wild cattle, deer, hare, turtles, fish, birds, and fresh water clams--all the local wild resources in the area.



Seasonality data for the Umm Qseir gazelle adds to our understanding of the subsistence economy. The advanced state of wear on many of the gazelle lower deciduous third molars, a tooth that is shed at about 14 months of age, indicate that these animals were hunted and killed around the time of their first birthday. Since gazelle in the region give birth in March and April, this means there was special emphasis on spring gazelle hunting. Wild game attracted to the region to feed on the tasty spring grasses would have been easy prey during this time of year.

Final Clues From Plant Remains

Plant remains from Umm Qseir reinforce the picture painted by the faunal (animal) data; the site must have been occupied year round. Contrary to our initial hypothesis, Halafian occupants of Umm Qseir were not pastoralists, but rather pioneering farmsteaders. People came to this previously uninhabited region, bringing with them their domestic sheep, goats, and pigs, as well as domestic crops--in effect carrying with them the basic elements of the Neolithic Revolution. In this relatively untouched environment with its plentiful wild resources, these early settlers did not march lock-step to the drum of the Neolithic Revolution. They did not settle down to a traditional village life based on

dependence on domestic resources. Nor did they use the area only as a seasonal feed lot for their domestic flocks.

Instead, Halafian Umm Qseirians took full advantage of the natural (wild) riches of this new environment in its seasons of plenty, while relying on their domestic resources to tide them through the lean times. Spring was the most bountiful season at Umm Qseir--a time when crops of emmer, barley, and pulses were harvested, and when wild game feeding on the abundant spring growth of the steppe was easy prey. During the hotter summer months and into the unproductive winter season, when game was likely more dispersed across the steppe, Umm Qseirians could rely on stored grain, fall fruiting wild shrubs and trees, and their domestic stock of sheep, goat, and pig.

North and South Khabur Basin Compared

Subsequent and ongoing analysis of animal and plant remains from 17 sites in the Khabur Basin demonstrates that Umm Qseir is not unique, but part of an increasingly interesting and unexpected picture of post-Neolithic subsistence in the region. These sites date from the first introduction of domesticated plants and animals into the region (8,000 - 7,000 B.C.) through the rise of the first state-level societies (3,000 - 2,000 B.C.). Village communities in the better watered, more densely populated north (today a highly productive dry farming zone) followed the expected post-Neolithic subsistence pattern, with increasingly exclusive reliance on domestic crops and herd animals. Even so, there is evidence that wild animals remained relatively plentiful in the area up through about 3,000 B.C.

In contrast, for more than 2,000 years, small isolated communities on the drier southern steppe developed highly localized subsistence practices. Residents of the southern steppe mixed and matched selected domesticates with a heavy dependence on a variety of wild resources. People of the more arid, marginal, sparsely populated area apparently compensated for the unpredictability of a high risk environment by expanding their resource base to include

both domestic and wild resources. Significantly, the greatest dietary eclecticism seems to be found not in the fertile heartland but in the more arid frontier. In the more difficult environment, people met the challenge by combining their earlier reliance on wild game with newer domesticated resources.

Conclusions

There are no more herds of wild animals on today's treeless steppe. The rich diversity of wild plants that once supported these herds has been replaced by mono-crop irrigated fields and by highly degraded pasture in outlying areas. The long term environmental impact of intensive agro-pastoral economies on wild resources in this region is inarguable.

Our information, however, indicates that the onset of environmental degradation did not immediately follow the introduction of farming and herding. Early inhabitants of this region mixed agriculture and hunting/collecting without significant ill effects on indigenous wild species of plants or animals. Significant ecological change accompanied the urban based, agricultural economy several thousand years after the establishment of the first farming communities in the region. The small sample of plant remains studied from 3rd millennium B.C. sites on the southern steppe indicates that by this time hardwoods had been replaced by fast growing shrubby plants, and animal dung had become the primary fuel source--the first fuel crisis in prehistory!

What does this case study of subsistence in the Khabur Basin tell us about the consequences of agriculture in the Near East? The impact of the Neolithic Revolution was not nearly as uniform, nor as irreversible as is sometimes portrayed. The realities after the "Revolution" do not conform to theories that see the origins of agriculture as either a technological blessing or an environmental blight locking people into an economy based solely on domestic resources. Once people became farmers and herders, many still continued to practice hunting and gathering, mixing

old and new strategies. A technology once discovered need not shackle people into its exclusive practice; a social organization or an economy once established need not be an immutable obstacle to cultural flexibility or human ingenuity.

For Further Reading

Clutton-Brock, J. The Walking Larder: Patterns of Domestication, Pastoralism, and Predation. London: Unwin Hyman, 1989.

Cowan, C.W. and P. J. Watson. The Origins of Agriculture. Washington, DC: Smithsonian Institution Press, 1992.

Zeder, Melinda A. "After the Revolution: Post-Neolithic Subsistence in Northern Mesopotamia," American Anthropologist 96(1):97-126.

Zeder, Melinda A. Feeding Cities: Specialized Animal Economy in the Ancient Near East. Smithsonian Institution Press, 1991.

Melinda A. Zeder
Department of Anthropology
National Museum of Natural History

MELINDA ZEDER TALKS TO ANTHRONOTES EDITORS

At nine I decided to become a Near Eastern archeologist, inspired by my mother who was writing an historical novel about the Egyptian Pharaoh Akhenaton. Alone, she

sailed up the Nile River and came home with fascinating stories of ruins and digs.

As a high school junior, I went on my first dig in Taos, New Mexico; by the end of the field season I was hooked, and took anthropology as a high school senior. As a sophomore at the University of Michigan, I worked in the museum washing animal bones, which I realized were an under-utilized archeological resource. I also worked with scientists developing one of the first computerized coding systems for the analysis of bones, allowing us to process huge amounts of observations to profile age and seasonality patterns, among other things. It took eleven years of sorting, identifying, and analyzing over 100,000 bones from a single site (Tal-e Malyan) before I had enough data and conclusions on feeding early cities to write a dissertation that led to my first book.

For me, the fun and fascination of archeology is making big ideas talk to little bits of data, and have the data answer back in meaningful ways. From the beginning of my career, I wanted to explain how early communities began to depend on domesticates, since these communities eventually became the foundations of large urban centers leading to the beginnings of large scale civilizations.

