# Learning Objectives

8.1 Explain the relationship between broad-spectrum collecting, sedentarism, and population growth in terms of preagricultural developments.

8.2 Discuss the domestication of plants and animals in the Near East, Mesoamerica, and elsewhere in the world.

8.3 Evaluate theories for why food production developed.

8.4 Critically analyze the consequences of food production.

8.5 Explain how archaeologists infer that a particular people in the past had social classes, cities, or a centralized government.

8.6 Describe the emergence of cities and states in southern Iraq.

8.7 Describe the emergence of cities and states in Mesoamerica.

8.8 Describe the first cities and states in other areas of the world.

8.9 Evaluate the major theories about the origin of the state.

8.10 Identify and explain consequences of state formation.

8.11 Discuss explanations for the decline and collapse of states.
the origins of cities and states. Much of our discussion focuses on the Middle East and Mesoamerica, the areas we know best archaeologically for the developments leading to food production and the rise of states.

Preagricultural Developments

The Middle East

In the Near East, there seems to have been a shift from mobile big-game hunting to the utilization of a broad spectrum of natural resources at the end of the Upper Paleolithic. There is evidence that people subsisted on a variety of resources, including fish, mollusks, and other water life; wild deer, sheep, and goats; and wild grains, nuts, and legumes. The increased utilization of stationary food sources such as wild grain may partly explain why some people in the Near East began to lead more sedentary lives during the Epipaleolithic.

Even today, a traveler passing through the Anatolian highlands of Turkey and other mountainous regions in the Near East may see thick stands of wild wheat and barley growing as densely as if they had been cultivated. Wielding flint sickles, Epipaleolithic people could easily have harvested a bountiful crop from such wild stands. Just how productive these resources can be was demonstrated in a field experiment duplicating prehistoric conditions. Using the kind of flint-blade sickle an Epipaleolithic worker would have used, researchers were able to harvest a little over two pounds of wild grain in an hour. A family of four, working only during the few weeks of the harvest season, probably could have reaped more wheat and barley than they needed for the entire year.

The amount of wild wheat harvested in the experiment prompted Kent Flannery to conclude, "Such a harvest would almost necessitate some degree of sedentism—after all, where could they go with an estimated metric ton of clean wheat?" Moreover, the stone
Nahal Meerot Cave on Mount Carmel, Israel, showing Paleolithic life in the cave. Epipaleolithic peoples built small shelters and lived sedentary life here.

equipment used for grinding would have been a clumsy burden to carry. Part of the harvest would probably have been set aside for immediate consumption, ground, and then cooked either by roasting or boiling. The rest of the harvest would have been stored to supply food for the remainder of the year. A grain diet, then, could have been the impetus for the construction of roasters, grinders, and storage pits by some preagricultural people, as well as for the construction of solid, fairly permanent housing. Once a village was built, people may have been reluctant to abandon it. We can visualize the earliest preagricultural settlements clustered around such naturally rich regions, as archaeological evidence indeed suggests they were.

The Natufians of the Middle East Eleven thousand years ago, the Natufians, a people living in the area that is now Israel and Jordan, inhabited caves and rock shelters and built villages on the slopes of Mount Carmel in Israel. At the front of their rock shelters, they hollowed out bar-n-shaped depressions in the rock, possibly for storage pits. For example, the site of Eynan contains the remains of three villages in sequence, one atop another. Each village consisted of about 50 circular pit houses. The floor of each house was sunk a few feet into the ground, so that the walls of the house consisted partly of earth, below ground level, and partly of stone, above ground level. The villages appear to have had stone-paved walks; circular stone pavements ringed with what seem to be permanent hearths; and the dead were interred in village cemeteries.

The tools suggest that the Natufians harvested wild grain intensively. Sickles recovered from their villages have a specific sheen, which experiments have shown to be the effect of flint striking grass stems, as the sickles would have been used in the cutting of grain. The Natufians are the earliest Epipaleolithic people known to have stored surplus crops. Beneath the floors of their stone-walled houses, they constructed plastered storage pits. The remains of many wild animals are found in Natufian sites; Natufians appear to have concentrated on hunting gazelle, which they would take by surrounding whole herds.10

The Natufians show many differences as compared with foragers in earlier periods.11 Not only was Natufian foraging based on a more intensive use of stationary resources
such as wild grain, but the archaeological evidence suggests increasing social complexity. Natufian sites on the average were five times larger than those of their predecessors. Communities were occupied for most of the year, if not year-round. Burial patterns suggest more social differences between people. Although the available wild cereal resources appear to have enabled the Natufians to live in relatively permanent villages, their diet seems to have suffered. Their tooth enamel shows signs of nutritional deficiency, and their stature declined over time.\(^{12}\)

**Mesoamerica**

A similar shift toward more broad-spectrum hunting and gathering occurred in the New World at the end of the Paleo-Indian period, about 10,000 years ago. The retreat of glacial ice from North America and overall warmer and wetter climate brought dramatic changes to plant and animal communities throughout North America and Mesoamerica. Pleistocene megafauna, such as mammoths, mastodon, rhinoceros, giant ground sloth, and others, as well as a variety of smaller game animals, such as the horse, all went extinct in a relatively short period of time.\(^{13}\) Hunting strategies shifted toward a broader range of game species, particularly deer, antelope, bison, and small mammals. At the same time, deciduous woodlands and grasslands expanded, providing a range of new plants to exploit. Ground stone woodworking tools such as axes and adzes first appeared, as did nut-processing tools such as mortars and pestles. Shellfish began to be exploited in some areas. Throughout North America and Mesoamerica, people began to expand the range of plants and animals they relied upon.\(^{14}\)

**The Archaic Peoples of Highland Mesoamerica** In Highland Mesoamerica, the mountainous regions of central and southern Mexico, we also see a shift from big game hunting to a broader use of resources, in part due to a change in climate more like today’s. Altitude became an important factor in the hunting and collecting regime, as different altitudes have different plant and animal resources. Valleys tend to have scrubby, grassland vegetation, whereas foothills and mountains have “thorn forests” of cactuses and succulents, giving way to oak and pine forests at higher altitudes, where there is more moisture. This vertical zonation means that a wide range of plants and animals were available in relatively close proximity—different environments were close by—and the Archaic peoples took advantage of these varied conditions to hunt and collect a broad range of resources.\(^{15}\)

About 8,000 years ago, the Archaic peoples in Mesoamerica appear to have moved seasonally between communities of two different sizes: camps with 15 to 30 residents (*macrobands*) and camps with only 2 to 5 residents (*microbands*). Macroband camps were located near seasonally abundant resources, such as acorns or mesquite pods. Several families would have come together when these resources were in season, both to take advantage of them and to work together to harvest them while they were plentiful, perhaps to perform rituals, and simply to socialize. Microband camps were also inhabited seasonally, probably by a single family, when groups were not assembled into macroband camps. Remains of these microband camps are often found in caves or rock shelters from which a variety of environments could be exploited by moving either upslope or downslope from the campsite.\(^{16}\) Unlike the Natufians of the Near East, there is no evidence of social differences among the Archaic peoples of Highland Mesoamerica.

**Other Areas**

The still-sparse archaeological record suggests that such a change occurred in Southeast Asia, which may have been one of the important centers of original plant and animal domestication.\(^{17}\) For example, at inland base camps, we find the remains of animals from high mountain ridges as well as lowland river valleys, birds and primates from nearby forests, bats from caves, and fish from streams. The few coastal sites indicate that many kinds of fish and shellfish were collected and that animals such as deer, wild cattle, and rhinoceroses were hunted.\(^{18}\) The preagricultural developments in Southeast Asia probably were responses to changes in the climate and environment, including a warming trend, more moisture, and a higher sea level.\(^{19}\)
In Africa, too, the preagricultural period was marked by a warmer, wetter environment. The now-numerous lakes, rivers, and other bodies of water provided fish, shellfish, and other resources that apparently allowed people to settle more permanently than they had before. For example, there were lakes in what is now the southern and central Sahara Desert, where people fished and hunted hippopotamuses and crocodiles. This pattern of broad-spectrum food-collecting seems also to have been characteristic of the areas both south and north of the Sahara. One area showing increased sedentarism is the Dakhleh Oasis in the Western Desert of Egypt. Between 9,000 years and 8,500 years ago, the inhabitants lived in circular stone huts on the shores of rivers and lakes. Bone harpoons and pottery are found there and in other areas from the Nile Valley through the central and southern Sahara westward to what is now Mali. Fishing seems to have allowed people to remain along the rivers and lakes for much of the year.

Why Did Broad-Spectrum Collecting Develop?

It is apparent that the preagricultural switch to broad-spectrum collecting was fairly common throughout the world. Climate change was probably at least partly responsible for the exploitation of new sources of food. For example, the worldwide rise in sea level because of glacial melting may have increased the availability of fish and shellfish. Changes in climate may have also been partly responsible for the decline in the availability of big game, particularly the large herb animals. Another possible cause of that decline was human activity, specifically overkilling of some of these animals. The extinction in the New World of many of the large Pleistocene animals, such as the mammoth, coincided with the movement of humans from the Bering Strait region into the Americas. But an enormous number of bird species also became extinct during the last few thousand years of the North American Pleistocene, and it is difficult to argue that human hunters caused all of those extinctions. Because the bird and mammal extinctions occurred simultaneously, it is likely that most or nearly all the extinctions were due to climatic and other environmental changes. Then again, the example of the New Zealand moas, which went extinct soon after humans colonized the islands, may be instructive. Moas had low reproductive rates; computer simulations suggest their population would have been very sensitive to increases in adult mortality. Because many large animals have low reproductive rates like moas, human overhunting may have been responsible for their extinction.

Population growth may also have led to broad-spectrum collecting. As Mark Cohen has noted, hunter-gatherers were “filling up” the world, and they may have had to seek new, possibly less desirable sources of food. We might think of shellfish as more desirable than mammoths, but only because we don’t have to do the work to get such food. A lot of shellfish have to be collected, shelled, and cooked to produce the amount of animal protein obtainable from one large animal.

Broad-spectrum collecting does not necessarily mean that people were eating better. A decline in stature often indicates a poorer diet. During the preagricultural period, height apparently declined by as much as two inches in many parts of the Old World (Greece, Israel, India, and northern and western Europe). In other areas of the world, such as Australia and what is now the midwestern United States, skeletal evidence also suggests a decline in the general level of health with the rise of broad-spectrum collecting.

Broad-Spectrum Collecting and Sedentarism

Does the switch to broad-spectrum collecting explain the increasingly sedentary way of life we see in various parts of the world in preagricultural times? The answer seems to be both yes and no. In some areas of the world—some sites in Europe, the Near East, Africa, and Peru—settlements became more permanent. In other areas, such as the semiarid highlands of Mesoamerica, the switch to broad-spectrum collecting was not associated with increasing sedentarism. Even after the Highland Mesoamericans began to cultivate plants, they still did not live in permanent villages. Why?

It would seem that it is not simply the switch to broad-spectrum collecting that accounts for increasing sedentarism in many areas. Rather, a comparison of settlements on the Peruvian coast suggests that the more permanent settlements were located nearer,
within 3½ miles, to most, if not all, of the diverse food resources exploited during the year. The community that did not have a year-round settlement seems to have depended on more widely distributed resources. What accounts for sedentarism may thus be the nearness or the high reliability and yield of the broad-spectrum resources, rather than the broad spectrum itself.

**Sedentarism and Population Growth**

Although some population growth undoubtedly occurred throughout the hunting and gathering phase of world history, some anthropologists have suggested that populations would have increased dramatically when people began to settle down.

The settling down of a nomadic group may reduce the typical spacing between births. Nomadic San people of Namibia and Botswana have children spaced four years apart on the average; in contrast, recently sedentarized San have children about three years apart. Why might birth spacing change with settling down? If effective contraceptives are not available, prolonged sexual abstinence after the birth of a child (the postpartum sex taboo), common in recent human societies, may be one way of reducing births. Another way is abortion or infanticide. Nomadic groups may be motivated to have children farther apart because of the problem of carrying small children.

Although some nomadic groups may have deliberately spaced births by abstinence or infanticide, there is no evidence that such practices explain why four years separate births among nomadic San. There may be another explanation, involving an unintended effect of how babies are fed. Nancy Howell and Richard Lee have suggested that the presence of baby foods other than mother’s milk may be responsible for the decreased birth spacing in sedentary agricultural San groups. It is now well established that the longer a mother nurses her baby without supplementary foods, the longer it is likely to be before she starts ovulating again. Nomadic San women have little to give their babies in the way of soft, digestible food, and the babies depend largely on mother’s milk for two to three years. But sedentary San mothers can give their babies soft foods such as cereal (made from

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A group of !Kung women heading out to collect plant foods. On some days, women will walk several miles to find the plants they want to harvest. Spacing births an average of four years apart helps to ensure that a woman will not have to carry more than one child at a time.
cultivated grain) and milk from domesticated animals. Such changes in feeding practices may shorten birth spacing by shortening the interval between birth and the resumption of ovulation. In preagricultural sedentary communities, it is possible that baby foods made from wild grains might have had the same effect. For this reason alone, therefore, populations may have grown even before people started to farm or herd.

Some investigators suspect that a critical minimum of fat in the body may be necessary for ovulation. A sedentary San woman may have more fatty tissue than a nomadic San woman, who walks many miles daily to gather wild plant foods, often carrying a child with her. Thus, sedentary San women might resume ovulating sooner after the birth of a baby, and so for that reason alone may be likely to have more closely spaced children. If some critical amount of fat is necessary for ovulation, that would explain why many women who have little body fat in our own society—long-distance runners, gymnasts, and ballet dancers are examples—do not ovulate regularly.36

The Domestication of Plants and Animals

Neolithic means "of the new stone age," the term originally signified the cultural stage in which humans invented pottery and ground-stone tools. We now know, however, that both were present in earlier times, so now archaeologists generally define the Neolithic in terms of the presence of domesticated plants and animals. In this type of culture, people began to produce food rather than merely collect it.

The line between food-collecting and food-producing occurs when people begin to plant crops and to keep and breed animals. How do we know when this transition occurred? In fact, archaeologically we do not see the beginning of food production; we can see signs of it only after plants and animals show differences from their wild varieties. When people plant crops, we refer to the process as cultivation. It is only when the crops cultivated and the animals raised are modified—different from wild varieties—that we speak of plant and animal domestication.

We know, in a particular site, that domestication occurred if plant remains have characteristics different from those of wild plants of the same types. For example, wild grains of barley and wheat have a fragile rachis—the seed-bearing part of the stem—which shatters easily, releasing the seeds. Domesticated grains have a tough rachis, which does not shatter easily. In addition, the grain of wild barley and wheat has a tough shell protecting the seed from premature exposure, whereas domesticated grain has a brittle shell that can be easily separated, which facilitates preparing the seed for grinding into flour.

Consider how the rachis of wheat and barley may have changed. When humans arrived with sickles and flails to collect the wild stands of grain, the seeds harvested probably contained a high proportion of tough-rachis mutants, because these could best withstand the rough treatment of harvest processing. If planted, the harvested seeds would be likely to produce tough-rachis plants. If, in each successive harvest, seeds from tough-rachis plants were the least likely to be lost, tough-rachis plants would come to predominate.37

Domesticated species of animals also differ from the wild varieties. For example, the horns of wild goats in the Near East are shaped differently from those of domesticated goats.38

Domestication in the Near East

For some time, most archaeologists have thought that the Fertile Crescent (see Figure 8.3), the arc of land stretching up from Israel and the Jordan Valley through southern Turkey and then downward to the western slopes of the Zagros Mountains in Iran, was one of the earliest centers of plant and animal domestication. We know that several varieties of domesticated wheat were being grown there after about 8000 B.C., as were oats, rye, barley, lentils, peas, and various fruits and nuts (apricots, pears, pomegranates, dates, figs, olives, almonds, and pistachios).39 It appears that animals were first domesticated in the Near East. Dogs were first domesticated before the rise of agriculture, around 13,000 B.C.; goats, sheep, cattle, and pigs around 7000 B.C., and perhaps even earlier.40