

13.2 Agriculture: An Adaptive Trade-Off

Most people assume that the adoption of agriculture was a highly positive development in human history. Indeed, agriculture's potential for supporting large numbers of people living in a concentrated setting and for creating surplus and, thus, wealth for some laid the foundation for the great civilizations of the past—such as in China, South America, and Mexico—and those of today.

Beginning with the earliest cities in the Early Holocene, no complex society anywhere in the world would have been possible without an agricultural economic base. Writing, art, business, technology, and just about every other feature of modern life came about because of agriculture. However, the rise of complex societies, of civilizations, and of technologically sophisticated ways to acquire both food and other resources also brought about a number of profound, and largely negative, consequences for humankind.

Population Growth

Probably the single most visible characteristic associated with the shift from foraging to farming is the increase in population size. Called the *Neolithic demographic transition*, this shift from low birthrate to high birthrate resulted in a rapid increase in the world's population. The greater number of births was brought about by a reduced period of weaning. The availability of grains cooked into soft mushes and fed to

weaning. The availability of grains cooked into soft mushes and fed to infants made it possible to wean infants earlier in their lives. With earlier weaning, spacing between births was reduced, and mothers were able to produce more offspring.

The first major demographic transition in human evolution spurred a remarkable increase in human population around the globe. This pattern continues to the present day and continues to place increased demands on the environment. (This development is discussed further in chapter 14.)

The growth of human population in the past 10,000 years is staggering. The world population around 10,000 yBP was probably no more than 10 million people. By 2,000 yBP, population had likely increased to 250 million or 300 million. By AD 1850, population had increased to 1 billion, and today it is more than 7.5 billion (**Figure 13.9**). Increasing population leads to competition for resources. As towns and cities began to compete for increasingly limited resources (for example, arable land for crops), organized warfare developed. Interpersonal violence has a long history in human evolution, going back at least to Neandertals in the Late Pleistocene. But the level of violence among pre-Holocene hominins was nothing compared with that of the early civilizations in Southwest Asia, Central America, and South America or with the medieval wars in Europe, where thousands of people were killed in organized warfare and interpersonal conflict (**Figure 13.10**). As the study of human remains shows, organized violence has likely been present in small societies as well.

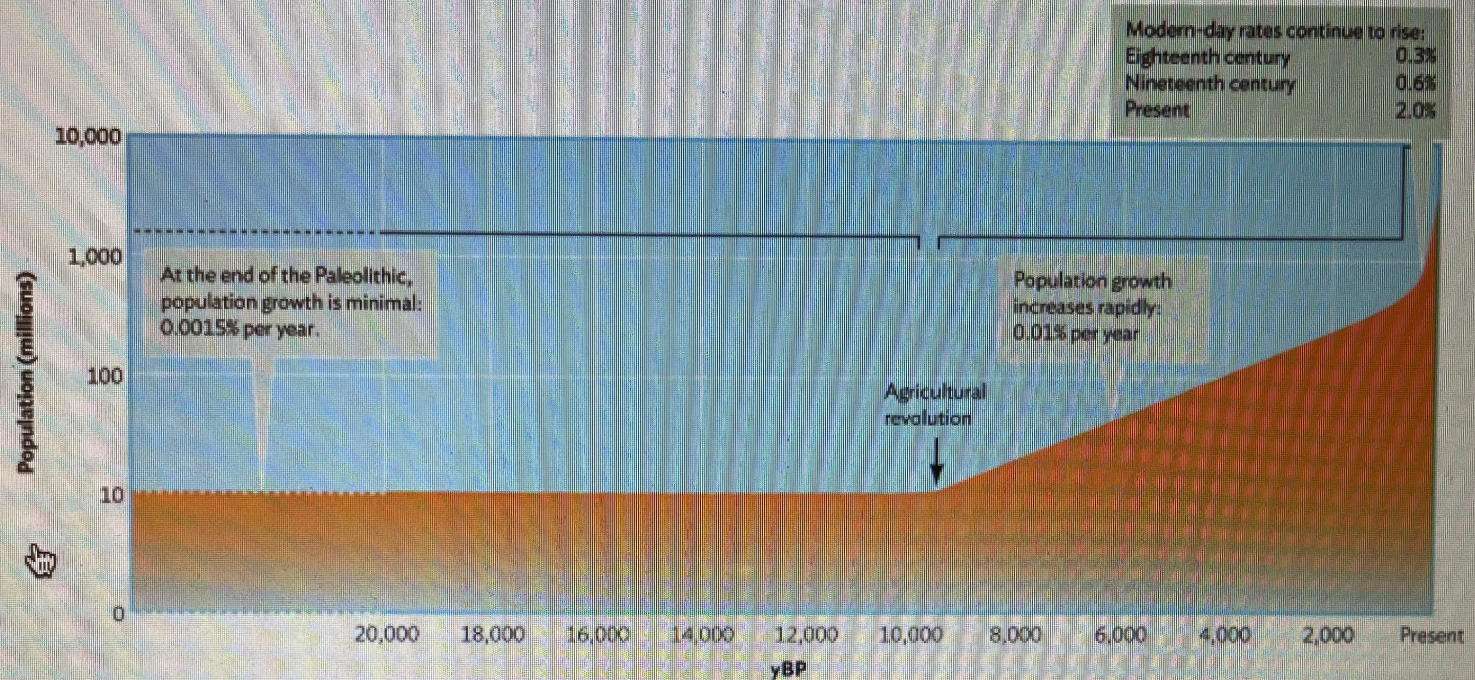


FIGURE 13.9

World Population Size This graph shows the trend in population size on a global scale. Until 10,000 yBP and the advent of agriculture, population remained constant, numbering perhaps as many as 10 million people. After the agricultural revolution, however, population skyrocketed.



(b)

(a)



(c)

FIGURE 13.10

Interpersonal Conflict Skeletons from all regions of the world provide evidence of warfare and of organized violence, especially after the adoption of agriculture and the creation of towns and then cities. (a) Cranial depression fractures, such as this one on the frontal bone of the Neolithic early farmer remains from Çatalhöyük, Turkey, are the result of blunt-force trauma. (b) These skeletons are the remains of victims of battle in ninth-century-BCE Iran. They were discovered on the floors of buildings that had been burned during the conflict. (Photo: Penn Museum image no. 78138) (c) This cranium received its puncture wound (square hole) during a late medieval massacre, the Battle of Towton, in England.

ANTHROPOLOGY MATTERS

FIRST WARFARE

The Massacre at Kilianstädten

Violence and interpersonal conflict have long been a part of the fabric of human behavior.

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▶ WATCH THE VIDEO

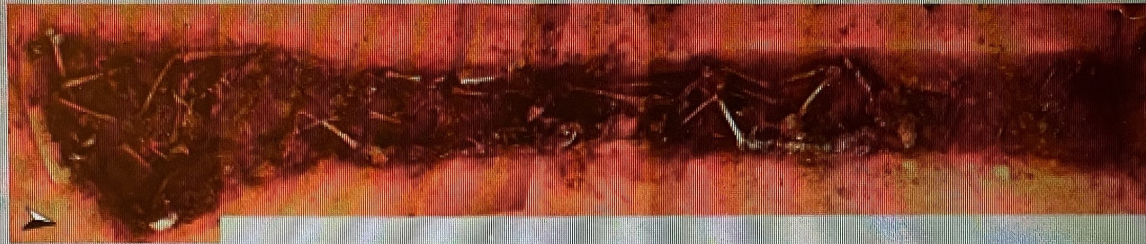


The record of violence—where one individual does bodily harm to another—extends back before the appearance of modern *Homo sapiens*. For example, several of the Krapina Neandertals (see chapter 12) display cranial injuries caused by blows to their heads. However, these injuries were likely isolated occurrences involving no more than two individuals and certainly do not qualify as what we consider to be warfare. The record of systematic,

planned aggression involving multiple attackers and multiple victims—that is, warfare—is not present until quite recently in human evolution. In fact, the record of systematic violence does not become visible until the first appearance of farming, beginning in the Neolithic.

The Neolithic involved profound changes in foods eaten, settlement location and size, and living conditions in general. It is a time during which people settled in permanent communities where considerable economic investment in crops and livestock was made within a relatively restricted region. It is likely that these circumstances are related to the origins of organized conflict, especially warfare. Essentially, population size increase and competition for land set the stage for one group fighting with another,

competition for land set the stage for one group fighting with another, usually with deadly outcomes for entire groups of individuals.



The Neolithic mass grave at Kilianstädten, Germany. After the massacre, the remains of the dead were collected and thrown haphazardly into a trench. These remains represent some of the earliest evidence of warfare.

The first instances of warfare are well documented from the study of massacre victims from Neolithic farming settlements in central Europe, dating to circa 7,600–6,900 yBP. These massacres provide evidence of conflict involving multiple deaths occurring in one catastrophic event. The Kilianstädten site in Germany contains an especially well-preserved record of massacre. A burial pit at this locality contained the disarticulated and jumbled skeletal remains of 26 individuals who died under violent attack by a foreign group. Study of the victims' remains led by German biological anthropologist Christian Meyer revealed that the remains are equally represented by children and adults. Some of the children were less than 6 years old when they died violently, including one 6-month-old infant. Most of the adults were younger adult males, and only two were older than 40. Like other early farming populations, the victims have an elevated

Like other early farming populations, the victims have an elevated frequency of disease, including tuberculosis and various infections often associated with living in close, crowded conditions (see Figure 13.26).

Most striking about the record of violence at Kilianstädten is the elevated frequency of blunt-force cranial trauma and fractures of the limb bones. The blunt-force cranial injuries were caused by an attacker hitting the victim's head with a stone implement. Most of the cranial injuries are to the left parietal bone, indicating that the victim was facing a right-handed attacker. The limb-bone fractures are especially prevalent in the distal tibias. More than half of the tibias had fractures that occurred at the time of death. In combination, the very consistent pattern of trauma reveals that the heads and lower legs were targeted during the attack. At some point after the attack, a large, linear pit was dug. The remains of the deceased were haphazardly deposited in the pit, and the pit was refilled with dirt. The random positioning of the bones and bodies suggests that the burial was rapid.

The Kilianstädten massacre was not an isolated occurrence. Rather, a number of Neolithic localities in Germany and elsewhere show remains with the same kinds of injuries and haphazard disposal of the deceased. Collectively, the record indicates that specific communities were singled out; men, women, and children were beaten, tortured, and killed in violent, painful ways; and the bodies were disposed of in a highly careless fashion. The reasons for the extreme violence and why these particular groups bore the brunt of attack will never be known, but they were likely close neighbors and in competition for

Why these particular groups were the target of attack will never be known, but they were likely close neighbors and in competition for land. Perhaps climatic changes taking place during this time made agriculture less predictable, resulting in a reduced availability of foods derived from crops. As shown by numerous studies, there are clear associations between uncertainty of food production and elevated violence. Regardless of the causes or circumstances, the Kilianstädten and contemporary massacre sites in Neolithic central Europe exemplify a new kind of violence involving careful planning with lethal intent. The study of these massacre skeletons provides an important window onto the people that lived and died in Neolithic central Europe and vital insights into the beginning of warfare.





Cranial trauma of victims of the massacre was intentional and deadly. The arrows in the examples of victims point to massive fractures caused by sharp stone weapons.

The study of conflict in past populations when viewed in the context of a setting involving competition for resources by two or more groups of people provides a basis for understanding warfare and conflict today. Namely, there are various outcomes of competition between social groups, including conflict resulting in injury and death. Indeed, *anthropology matters*.

Environmental Degradation

The consequences of environmental degradation, like those of extreme population growth, are well documented by historians and ecologists for recent human history. This degradation actually has a much more ancient origin, beginning with plant and animal domestication around 10,000 yBP. For much of the region surrounding the Mediterranean, especially the Levant, landscapes have been substantially transformed and degraded. Dense settlement based on agrarian economies has contributed to soil erosion, making it increasingly difficult to produce food. Around 8,000 yBP, a number

it increasingly difficult to produce food. Around 8,000 yBP, a number of large towns in the eastern Mediterranean were abandoned, probably due mostly to a period of climate drying. Contributing to the abandonment, however, was human activity, such as overgrazing with goats, which resulted in damaging erosion. Moreover, the amount of fuel, especially wood, needed to support the community resulted in the destruction of native vegetation and the desiccation of landscapes (Figure 13.11).

Likewise, the recent collapse of coastal ecosystems worldwide clearly had its start in overfishing—especially of large vertebrates (for example, whales) and shellfish—beginning thousands of years ago. Simply, the dramatically altered ecosystems worldwide have caused biodiversity to crash, a development that appears to be accelerating. The American anthropologist Jeffrey McKee argues that one primary force behind the reduction in biodiversity is expanding human population size. He predicts that if left unchecked, the population will outstrip the arable land available to produce the plants and animals consumed by humans. Thus, the increased food supply that resulted from the agricultural revolution in the Holocene could, in the not-too-distant future, lead to a food crisis (discussed further in chapter 14).

CONCEPT CHECK

CONCEPT CHECK

The Good and Bad of Agriculture

Agriculture had many advantages for human adaptation, but there were also trade-offs.

Advantages

Support for feeding larger numbers of people

Creation of surplus food for leaner times

Long-term food storage, especially of grains, for later consumption

Disadvantages

Increased demands on the environment (land degradation)

Pollution

Conflict between populations competing for the same lands

Loss of wild species through overhunting and displacement

Decline of biodiversity

Health costs and quality-of-life implications





FIGURE 13.11

Human Impact With the domestication of plants and of animals, humans began having a greater impact on the world. Soil erosion, deforestation, and overgrazing have contributed to many environmental problems. Excessive tree-cutting, such as shown here in China, can lead to greater soil erosion and to desertification.