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## PSYCHOLOGY IN PREHISTORY

### ZEITGEIST

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#### Camping

Camping is one way to imagine what life was like for humans in the distant past. Of course, even wilderness camping with only a backpack does not come remotely close to duplicating what early human hunter-gatherer groups must have experienced daily. Here are some aspects of 21st century camping along with a partial list of what to bring and then pack into a *vehicle*.

- Tent
- Sleeping bag
- Flashlight
- Cook stove, fuel, matches, dishes and cutlery, and food
- Fishing gear
- Hunting gear
- Extra clothes and rain gear
- Ice chest and ice

Put *gas* in the *vehicle*, drive it down the *road* to a *campsite* in the wilderness and begin to camp. That means picking a *site*, setting up the *tent*, starting a *fire* with *matches*, and making dinner on a portable *cook stove*. Afterwards, it means washing the *dishes*, getting the camp ready for nighttime, and getting into the *sleeping bag* on top of an *air mattress*. In the morning, it means a trip to the *restroom*, preparing breakfast, cleaning up, catching fish with a *rod and reel*, making lunch, cleaning up again, hunting for supper with a *rifle*, preparing supper, and on and on. After a few days of this, civilization beckons.

Look at all the items italicized in the paragraph above. None of those were available to early hominins unless they made or found similar items themselves. Now imagine camping again, but without the modern conveniences. There are no vehicles, roads, or prepared campsites. As Hildebrand (1999) noted, some places make for better campsites

than others; the best ones are on the border between a refuge and a prospect (a place rich in resources). There are no stores and no refrigeration. Shelter, if any, must be made or found. There's no return to civilization either. "Camping" is permanent. Sound like fun?

## PREVIEW

This chapter is chock full of ideas which is not surprising given that it covers the longest period of human existence. The tremendous discrepancy between prehistoric and historic *time* is a major feature of human history. Grasping the enormity of our species time on Earth is nearly impossible. Other important ideas are so ingrained that they are difficult to recognize. These include *toolmaking*, *language*, and *sociality*. Humans have adapted to many different lifestyles as well. *Hunter-gatherers* still exist even as most people now live in *urbanized* settings. *Civilization* has wrought many changes, too, but is all too easily disrupted when its foundations crumble. *Philosophy* is just one of the results of civilization's ability to create surpluses of material goods and time. The earliest philosophers wondered about the *nature of the universe*, the *origin of life*, the *reliability of sensory information*, and they coined the first -isms: *materialism*, *nihilism*, *monism*, *dualism*, and *relativism*. The development of *medicine* is another major idea. Medicine began as an *empirical* discipline but eventually lost that characteristic. Hippocratic *humorism* persisted for thousands of years because physicians had become dependent on ancient but unproven ideas.

## INTRODUCTION

One of the main purposes of this chapter is to emphasize how little time recorded history occupies within the vast span of natural history. Within those many billions of years, human life spans are less than mere instants. Fortunately, Sagan (1977) created a powerful analogy, the cosmic calendar, to explain how much time has passed since the Big Bang, the primordial explosion that created the universe some 14 billion years ago. In his analogy, Sagan maps time since the Big Bang onto a one-year calendar where January 1 is when the Big Bang happened and January 1 a year later is today. Here are some of his dates:

January 1	----	The Big Bang
September 9	----	The Solar System forms
September 14	----	The Earth forms
September 25	----	Life on Earth begins (no fossil evidence remains for these earliest one-celled organisms)

October 9	----	Oldest fossils known (bacteria and blue-green algae)
December 16	----	First worms (fossil evidence of multicellular organisms)
December 19	----	First fish (first vertebrates)
December 20	----	Plants begin to colonize surface of Earth
December 21	----	First insects
December 22	----	First amphibians
December 23	----	First reptiles
December 24	----	First dinosaurs
December 26	----	First mammals
December 27	----	First birds
December 28	----	Dinosaurs extinct
December 29	----	First primates (our phylogenetic lineage)
December 30	----	First hominins (human-like organisms)
December 31		
10:30 p.m.	----	First humans
11:00 p.m.	----	Extensive use of stone tools
11:46 p.m.	----	Fire domesticated
11:56 p.m.	----	Last ice age begins
11:58 p.m.	----	Australia settled by sea-traveling peoples
11:59 p.m.	----	European cave paintings created
11:59:20 p.m.	----	Agriculture invented
11:59:35 p.m.	----	First cities built and settled, philosophy begins
11:59:53 p.m.	----	Bronze Age and Trojan War
11:59:54 p.m.	----	Iron Age and biblical Kingdom of Israel
11:59:56 p.m.	----	High point of Roman Empire and birth of Jesus
11:59:57 p.m.	----	Invention of number zero and Moslem conquests
11:59:58 p.m.	----	Crusades and high point of Mayan civilization
11:59:59 p.m.	----	Renaissance, discovery of "New World," rise of science
12:00:01 a.m.	----	Today

Sagan's cosmic calendar clearly illustrated how little time humans have been living on Earth. Although this chapter will cover some four million years of **hominin** existence, that enormous span of years is small in comparison to the life span of the universe and of the planet. Psychology is thus very very young science.

### LEARNING OBJECTIVE

1. Calculate the length of each of Sagan's days, hours, and minutes.

## EARLY HOMININS

Members of *Homo sapiens*, our own species, are mammals; members of the family *Hominidae*, which includes only four living genera: chimpanzees (*Pan*), humans (*Homo*), gorillas (*Gorilla*), and orangutans (*Pongo*). DNA evidence places chimpanzees as the closest living phylogenetic relatives to humans, sharing about 95% of their DNA (Britten, 2002). Hobolth et al. (2007) dated the divergence of chimpanzees and humans from a common ancestor to a point as early as four million years ago. Anthropological research puts the origin of hominins back further in time, to almost seven million years ago (Zollikofer et al., 2005). Varki and Gagneux (2016) used anthropogeny, the study of the origin of the human species, to analyze a wide variety of differences between humans and great apes. They provided a comprehensive timeline analysis when uniquely human features evolved including: bipedalism, control over fire, cooking, and much larger brains. The rarity of hominin fossils and the wide range of intraspecific variation make more precise dating difficult and subject to change.

The only living hominin species, *Homo sapiens*, has been basically similar in structure and behavior for about 50,000 years or since the "creative explosion" (Pfeiffer, 1982) that began around that time according to archeological evidence. Tools and other artifacts suddenly became more complex and varied, and for the first time were made of materials other than stone (Tattersall, 1999). By 40,000 years ago *Homo sapiens* had populated the entire world. Soon afterward all other hominin species went extinct. However, the whole picture is much more complicated.

One million years ago, an older hominin species, *Homo erectus*, migrated from Africa into Asia and Europe. Around 600,000 years ago, another hominin species, *Homo heidelbergensis*, migrated out of Africa, too. Some members of that species ended up in Europe and evolved into the Neanderthals or *Homo neanderthalensis*. The *Homo heidelbergensis* African populations provided the rootstock for the evolution of *Homo sapiens*. Thus, there were three separate species of hominins that coexisted about 100,000 years ago.

After the creative explosion described above, *Homo sapiens*' fossil record shows a vastly expanded collection of tools and artifacts, new living habits and ceremonies, and the ability to control fire (Twomey, 2020) and hunt dangerous game successfully. In a relatively short

span of geological time, *Homo sapiens* became the only hominin species left on Earth. Why that happened is still unclear. One theory is that the development of the nuclear family was responsible. Another is that cognitive change, especially the development of language, was the key component (Johanson, n.d.). Genetic evidence largely confirms the anthropological picture. Modern humans are amazingly genetically similar to each other. So, modern humans comprise one closely related species that somehow outcompeted and replaced several coexisting species around 30,000 years ago (Li et al., 2008). Varki (2013, p. 29) stated about behaviorally modern humans (BMHs), “despite evidence for cross-fertility with other ancient hominins (including some in Africa), we BMHs remained largely genetically distinct, despite tens of thousands of years of opportunity to mate and mingle into a distinct hybrid species in each locale.” Recently, Gabora and Smith (2020) proposed Self-Other Reorganization theory to explain cultural evolution in human history. They analyzed the much older transition (e.g., beginning 2.8 million years ago) from *Australopithecus* to *Homo* and a more recent transition (beginning as early as 200,000 years ago) resulting in behavioral modernity (BM). Better and more types of stone tools, ritualistic burial sites, objects used for personal ornamentation, cave art, improved living spaces with hearths, better and more varied diet, and engraved bone and antler tools are all examples of BM. They concluded (p. 234), “We suggest that the origins of BM be considered an evolutionary transition that culminated in new varieties of information, both within the mind and in artificial memory systems external to it, giving way to new social arrangements, and paving the way for the complex cultural systems in which we are presently immersed.” Bipedalism, toolmaking, language, and sociality are some of the characteristics of BM.

## BASIC HUMAN CHARACTERISTICS

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### Bipedalism

All hominins, modern and ancient, walked upright on their hind feet (Harcourt-Smith & Aiello, 2004) while modern apes and monkeys usually move around using all four limbs. Sockol et al. (2007) conducted treadmill studies with modern humans and chimpanzees. They found that human bipedal walking is nearly 75% more efficient than chimpanzee bipedal walking. They speculated (p. 12, 268) that “even if early hominins used a bent-hip, bent-knee form of bipedalism (25), our results suggest that early transitional forms would have reaped some energy savings with minor increases in hip extension and leg length.” Rolian et al. (2009) suggested that human feet are an adaptation for long-distance endurance running. Bramble and Lieberman (2004) linked endurance running as a selective advantage for early *Homo* species. Well-conditioned modern !Kung humans are able to run down larger animals (persistence hunting). Glaub and Hall (2017) documented that the !Kung have a strong positive energy return on investment when running down large prey animals. Energy efficiency seems a likely selective advantage of our bipedalism and it frees the forelimbs for other duties such as toolmaking.

## Toolmaking

Before Goodall (1971) observations of chimpanzee toolmaking researchers thought that only humans created tools. Since then many animals, especially birds and other primates have been observed making and using simple tools. Nonspecialists would probably mistake the earliest human tools for ordinary rocks. Those earliest rock tools were discovered in Gona, Ethiopia, and have been dated to about two and a half million years ago (Semaw et al., 1997). They have sharp edges made by knocking off flakes from a hand-size rock with another rock (Photo 2.1).



PHOTO 2.1 Gona stone chopper

New, sophisticated Acheulean tools, primarily hand axes and choppers, were made by *Homo erectus*, a million years later. Their usual shape is long, with narrow point at one end and a rounded, hammer-like shape at the other. They persisted in the fossil record for another one and a half million years. The differences between the older and newer tools revealed differences in thinking between the early hominins that produced them. The Acheulean toolmakers selected specific rocks as raw material and had to mentally envision the final product. Acheulean hand axes, regardless of their size or age, exhibit a remarkably consistent height to width ratio ( $\phi$ ), or the golden mean,  $\sim 1.6$  to 1 (Gowlett, 1984). Hodgson (2020) argued that hand axes were first designed for their utility and later by esthetic symmetry. A modern analogy is the steering wheel. Some of the earliest automobiles used a front-mounted tiller to steer. Once the steering wheel replaced it there was no need to develop another way to steer. All steering wheels work the same way, but many differ esthetically being leather wrapped, wood grained, or with different spoke designs. Similarly, once the Acheulean hand axe was invented, it may have inhibited further functional innovation to it but remained open to esthetic changes.

Broad and fat Levallois tools (first made by *Homo heidelbergensis*) were next step in hominin toolmaking; they were made by first flaking a large piece of rock until it was the approximate

shape desired. The last step was to knock the entire, worked piece loose. Levallois tools appear in the fossil record around 300,000 years ago as do wooden ones, spears being the most common (Zimmer, 2005). Around 80,000 years ago newer tools and objects made of materials other than stone appeared in the fossil record, including items with decorative function: beads and other primitive jewelry. Also found were large numbers of sculpted figurines, usually female. One of the oldest known human sculptures was found in Germany; it was a small (2.5" tall) 40,000 year old figurine of a woman with exaggerated physical features (Mellars, 2009). The discovery of these and other objects made by early humans provide evidence of their emerging cognitive capacities (Curry, 2012). When combined with other accomplishments from this period such as cave art and jewelry, it appears the species that produced these objects, *Homo sapiens*, is our own.

## Language

Spoken languages are a universal human characteristic. At present, there are over 6,000 languages spoken in the world, but that number is dwindling rapidly (Diamond, 1993). Researchers have correlated linguistic, anthropological, and genetic data to trace the origins of human languages. One discovery was a relatively recent mutation (200,000 to 400,000 years ago) of the FOXP2 gene. This gene is found widely throughout living creatures, from yeast to humans. However, the mutated form is only found in modern humans and *Homo neanderthalensis* (Krause et al., 2007). That has led researchers to believe that the rise of language may have had a genetic basis. Specifically, the FOXP2 gene may be part of a larger complex related to the evolution of language. Enard et al. (2009) altered the FOXP2 gene of mice endogenously, so it had the same genetic structure as the normal human FOXP2 gene. Those mice exhibited lower-pitched vocalizations and specific brain alterations in their basal ganglia. Staes, N., Sherwood, C.C., Wright, K. et al. (2017) found FOXP2 differences in among five ape species. They concluded that the genetic differences were low and that further research might reveal how the gene affects more proximate linguistic mechanisms. Zimmer (2011, pp. 22–24) summarized the gene's effect:

FOXP2 didn't give us language all on its own. In our brains, it acts more like a foreman, handing out instructions to at least 84 target genes in the developing basal ganglia. Even this full crew of genes explains language only in part, because the ability to form words is just the beginning. Then comes the higher level of complexity: combining words according to rules of grammar to give them meaning.

It is nearly certain that *Homo sapiens* spoke 50,000 years ago, and it is very likely that *Homo neanderthalensis* did also. Many languages show obvious evolutionary relationships with each other while others are nearly devoid of any connection to other languages. Click languages, for instance, are found only in Africa and appear to be among the oldest of languages. In those languages, clicking sounds, formed by using the tongue and lips, have meaning (Greenberg, 1970). Another outlier is the Basque language (Euskara) still spoken in northwest Spain. It is completely unrelated to the Indo-European family of languages spoken in the regions nearby.



In addition, genetic analyses of the Basque population indicate that it, too, is genetically unrelated to its near neighbors. Both the Basque language and its speakers appear to be the descendants of early settlers to the European peninsula (Harding & Sokal, 1988). In general, much of the data emanating from studies of linguistic evolution support independent evidence about early humans gleaned from anthropology and genetics.

## Sociality

Another characteristic of *Homo sapiens* is increased levels of social behavior. No one can ever know for sure whether the extinctions of *Homo neanderthalensis* and *Homo erectus* were due to direct (e.g., warfare) or indirect (e.g., natural selection) competition. Some theorists suggest that along with language came an increased capacity for social behavior evidenced by larger-sized bands and mechanisms for minimizing negative effects from contact with other *Homo sapiens* groups. Donald (2020) argued that a collection of interrelated factors: access to procedural memory, metacognitive self-supervision, developmental plasticity, socialization, and mind-sharing (cooperative cognitive work) each contributed to sociality. He concluded (p.294), “It was the emergent properties of those kinds of networks that necessitated the invention of more complex languages, and the elaborate mental life they enabled.” The dominant lifestyle of these evolving groups was hunter-gatherer which required a nomadic existence marked by searching for game and plant materials. In these bands, just as in modern hunter-gatherer groups, men did the hunting and women did the gathering.

### LEARNING OBJECTIVE

2. Illustrate an example of mindsharing or cooperative cognitive work you have engaged in with another using few if any words.

## HUNTER-GATHERERS

Until about 10,000 years ago the nearly universal lifestyle of early hominins revolved around hunting and gathering. That lifestyle also required constant movement from place to place as local resources were depleted. Eals and Silverman (1994) proposed a **hunter-gatherer** hypothesis that claimed that evolving under the conditions required by the hunter-gatherer lifestyle led hominin species to diverge by gender based upon the different skill sets required by that lifestyle; differences, they maintain, that are still manifest today in modern humans. Research since then has supported that hypothesis. Kimura (2004, p. 47) stated:

Favoring males are these: performance on certain spatial tasks (particularly mental rotation), throwing accuracy and mathematical reasoning tasks; favoring females: verbal memory, and recall of object locations presented in an array.



She added that the effect sizes between these gender differences are large. Other research (Silverman et al., 2007) supported the gender differences found and extended them across seven ethnic groups in 40 countries. Thus, gender differences in thinking are probably relics of the Stone Age and of thousands of years of natural selection for the skills required for the hunter-gatherer lifestyle. Kimura (1992, p. 125) claimed gender differences in cognition exist because “sex differences in cognitive patterns arose because they proved evolutionary advantageous.” Furthermore, the adaptive circumstances surrounding those gender differences remained in place for thousands of years. Whether our hunter-gatherer evolutionary heritage is still adaptive today remains open to debate.

Clearly, human cognitive abilities today still reveal the effects of millions of years of living in the hunter-gatherer lifestyle. Thus, studying modern, extant groups of hunter-gatherers is a fruitful way to infer information about early hominins. Modern hunter-gatherer groups apparently remained in the same state as early *Homo sapiens* until recent times. Typically, these living hunter-gatherer groups were “discovered” by more technologically advanced humans, and once discovered, the hunter-gatherers were usually more than happy to avail themselves of modern technology that made their lives more comfortable. They quickly and successfully adopted modern tools and weapons. These modern hunter-gatherers, then, are just as smart and capable as other more technologically advanced humans. They have the cognitive potential to use modern things, but did not independently discover or develop similar technological solutions. At the same time profound lifestyle differences emerged between hunter-gatherers and urbanites.

When prehistoric hunter-gatherers became farmers their health declined. et al. Cordain (1999, p. 384) stated that as people moved from hunter-gathering to farming:

there was a characteristic reduction in stature [3], an increase in infant mortality [3, 4], a reduction in life span [3, 4, 7], an increased incidence of infectious diseases [3, 4, 7, 8], an increase in iron deficiency anaemia [3, 4, 7, 8], an increased incidence of osteomalacia, porotic hyperostosis and other bone mineral disorders [3, 4, 7, 8] and an increase in the number of dental caries and enamel effects.

Similarly, modern humans are affected by the “diseases of civilization,” or obesity, coronary heart disease, and type 2 diabetes that are nearly absent in hunter-gatherers (Milton, 2000). The fact is that as human groups, either ancient or modern, moved from hunter-gathering to civilized lifestyles, they saw their health change. That change is called the “discordance hypothesis” (Konner, 2001) and it, attempts to assess the disjunction between those [hunter-gatherer] environments and the ones we live in now (p. 360).

But, adopting a civilized lifestyle has led to lowered infant mortality, increased rates of growth in childhood, and longer life expectancies (Eaton et al., 1988). In Africa today, the health benefits of the diet and lifestyle of modern hunter-gatherers are offset “by relatively high mortality resulting from hunting accidents, falls from honey and fruit trees, snakebites and human conflict” (Dounias & Froment, 2006, p. 224). The bottom line seems to be that humans have changed little physiologically in the last 40,000 years. However, the move from

hunter-gathering to farming and then to urbanization has led to large differences in health and well-being in positive and negative directions.

Diamond (1997) argued that Eurasian geography, which is predominantly East-West, plus the domestication of plants and animals already suited to life at those latitudes, promoted the rapid spread of new technologies across Asia and Europe. He contrasted these correlated events in Eurasian cultures to those of cultures living in areas with North–South geographies or with little access to domesticable plants or animals. His conclusion was that Eurasia’s head start, combined with a fortuitous set of geographical and ecological circumstances, predisposed peoples living there to first discover, and later use their technologies to carry themselves and their ideas around the world. Morris (2010) echoed Diamond’s analysis and extended it into the future. He speculated (p. 33) that, “Geography is...losing meaning. The world is shrinking and the greatest challenges we face—nuclear weapons, climate change, mass migration, epidemics, food and water supply—are all global problems.” Relatively unaffected, however, were many contemporary isolated hunter-gatherer groups. Those groups allow scientists to speculate about what human groups must have been like around 50,000 years ago. Konner (2020) examined living hunter-gatherers’ diets, mother primacy, parental care, alloparenting, and sibling care by older children. He believed such data contributed to our understanding of ancient hunter-gatherers but agreed that archeological data should remain the primary source for understanding the hunter-gatherer lifestyle.

### LEARNING OBJECTIVE

3. Appraise whether the recent use of Zoom or similar electronic tools to teach courses made geography lose its traditional distance barriers.

### STONE AGE THINKING

Mithen (1996) divided Stone Age intelligence into three categories: natural history intelligence, technical intelligence, and social intelligence. Natural history intelligence relates to knowledge about world and includes knowing about physical things like tides or biological things like whether a particular animal or plant is dangerous. Technical intelligence relates to knowing how to create and use tools and other artifacts. Finally, social intelligence relates to knowing about how to live with family members and neighbors while also knowing who one’s enemies are. Most modern humans probably are less aware of the practical aspects of natural history intelligence (e.g., the yearly path of the sun, which wood burns hottest, or what wild plants are safe to eat) than are hunter-gatherers, either modern or ancient. Most modern humans know much more about technical issues, plus they have much more to learn about technical matters than any hunter-gatherer ever did. Comparing social intelligence between modern and Stone Age humans is probably impossible. The social conditions surrounding hunter-gatherers and modern urban dwellers defy easy comparison. Should they switch places using a time machine the results would surely be disastrous for both.

## BORDER WITH COMPUTATIONAL SCIENCE

### TIME-FACTORED MARKINGS

Did prehistoric peoples have the ability to track the seasons? Marshack (1972) thought they did; he studied “time factored” markings discovered on prehistoric handheld objects. Time factored meant that the objects had marks on them that corresponded to astronomical events such as the phases of the moon. He claimed that humans who had lived 30,000 years ago had developed nonarithmetical methods for predicting recurrent events such as seasonal migrations of prey animals and biological rhythms such as menstruation. Marshack had his critics, however, “In the 1990s some younger scholars took exception to Marshack’s structuralist interpretations, preferring to see more magical and religious motives behind Paleolithic phenomena and decrying Marshack’s approach as excessively numerological” (*The Times*, 2005, p. 8).

## FARMING, SEDENTISM, AND DOMESTICATION

Today humans could not live without farming. Farmers produce enough food to sustain the entire human population (World Hunger Education Service, 2009). Malnutrition and starvation, then, comes not from the lack of food but from the inability to distribute food where it is needed. Wars, natural disasters, and economic downturns can disrupt existing food distribution networks causing local pockets of malnutrition or starvation. About 10,000 years ago, *Homo sapiens* nearly completely abandoned the hunter gathering lifestyle and adopted farming. The underlying logic behind the adoption of farming is not clear. Modern hunter-gatherers spend less time and effort “working” to sustain themselves than do non-mechanized modern farmers (Stuart, 1997). Also, modern hunter-gatherers water and feed wild plants and plant seasonal gardens. So, why would hunter-gatherers wish to become farmers?

Climate provides a clue. About 18,000 years ago, after the Last Glacial Maximum (LGM), the point of maximum extent of the last Ice Age, global average temperatures slowly rose and peaked about 11,000 years ago. Average temperatures then dropped again for over 1,000 years (the Younger Dryas). For the last 6,000 years, the global average temperature has remained relatively warm and constant. Today, scientists and world leaders worry that the average global temperature may be rising to new record-high levels due to human production of carbon dioxide and other industrial gases, the phenomenon of global warming. Dramatic worldwide temperature swings, regulated by natural cycles, are nothing new, however. They have occurred about every 100,000 years over the last million years. But, those temperature swings were not caused by human technology (Petit et al., 1999). Those naturally occurring climate oscillations may have been partly responsible for moving hunter-gatherers into a new lifestyle, **sedentism**, after the LGM. Holmes (2004) suggested additional reasons for the long and gradual switch to farming: competitive feasting, the new cultivated crops were a kind of luxury good; brewing beer, the grains grown were converted

into beer, not eaten; and the new foods sprung a population trap, once people began to farm, they had more children and could not easily return to a hunter-gatherer lifestyle. Morris (2010) emphasized the role of the “lucky latitudes” the parts of the world between 20 and 35 degrees north where farming was easiest and where domesticable animals and plants already existed. Few such lucky areas exist south of the equator. Geography, too, explains much about the origin of farming.

The earliest archeological evidence of sedentism dates from about 11,000 years ago. Alongside the Euphrates River at a village called Abu Hureyra (in northern Syria), people formed one of the first communities based on farming. They built mud houses, hunted migrating gazelles, planted wheat and barley, and domesticated sheep and goats (Moore et al., 2000). The village lasted for thousands of years, although at one point it was abandoned and later reestablished. Also important to sedentism was the domestication of plants and animals.

Domestication is the process of regulating breeding of plants and animals. Domestication has been successful only with a limited number of species. Diamond (1997, p. 132) wrote, “A mere dozen species account for over 80% of the world’s annual tonnage of all crops. Those dozen blockbusters are the cereals wheat, corn, rice, barley, and sorghum; the pulse soybean; the roots or tubers potato, manioc, and sweet potato; the sugar sources sugarcane and sugar beet; and the fruit banana.” Similarly, only a few species of terrestrial herbivores have been domesticated as well. Diamond stated (p. 159), “Only five species became widespread and important around the world. Those Major Five of mammal domestication are the cow, sheep, goat, pig, and horse.” Domestic plants and animals provided more than just food. Flax and cotton provided the raw materials for fabrics. Animals also provided muscle power, wool and hides as fabrics, milk, and organic fertilizer. Early domestication could have been unintentional. In the case of the wild wheats, for example, whose seeds shatter (drop from the plant) easily, early harvesters may have unintentionally altered the reproductive success of genetic variants whose seeds did not shatter by only cutting late maturing plants and perhaps later planting seeds left over from those plants (Mithen, 2004). Eventually, domestication did become intentional: saving some seeds for their desired genetic properties and planting them at the optimal time, selective breeding—allowing animals with desirable genetic characteristics to mate while denying that opportunity to those animals with less desirable genetic traits. Domestication did not require knowledge of genetics. Dogs (15,000 years ago) and cats (9,000 years ago) were domesticated very early and were the only carnivorous species domesticated.

The first continuously inhabited towns date from around 9,000 years ago. Jericho, in Israel, holds the distinction of being the oldest, continuously occupied town in the world. Slowly, most humans abandoned the hunter-gatherer lifestyle as towns and cities grew. Only recently have more people lived in cities than outside of them, the process of urbanization, changing lifestyles even for those who lived outside of towns and cities. Farmers, for example, could sell their surplus crops in urban markets. Urbanization continues to the present day.

## BORDER WITH BIOLOGY

### ANCIENT PSYCHOSURGERY

Psychosurgery surely seems modern, yet the evidence for trepanning (also called trephination), the intentional opening of a hole in the skull for therapeutic purposes, dates back to about 5,000 years ago. Hundreds of skulls with holes in them have been found in archeological sites around the world. While some of the holes were created after death, many were made while the patient was still alive. The holes in those skulls show signs of post-operative healing (Arnott et al., 2003). No one really knows why the practice of trepanning existed. Modern neurosurgeons cut openings in skulls in order to perform brain surgery, but they repair those holes, unlike their ancient predecessors. Photo 2.2 shows a trepanned skull from ancient Peru.



**PHOTO 2.2** Trepanned skull

*Credit: Album / Alamy Stock Photo*

### LEARNING OBJECTIVE

4. Diagnose why only two carnivores (dogs and cats) were domesticated.

## URBANIZATION

Urbanization began about 9,000 years ago in Mesopotamia (modern Iraq). Until very recently, the majority of people in the world lived outside of cities and towns: in villages, or in the countryside. The tipping point came in 2008 when, for the first time, more people

lived in cities (UNFPA, 2008). In Europe, 80% of the population lives in cities (Antrop, 2004). In 1950, New York was the world's largest city with a population of 12,463,000 in its metropolitan area (Chandler, 1987). In 2019, Tokyo was the largest city with a population of over 37,426,554 (populationstat.com) in its metropolitan area. In 2019, 21 cities exceeded the 10 million mark (City Mayors Statistics, n.d.) creating high population densities. NASA measures the extent of urbanization by satellite photographs of the Earth taken at night and classifies regions as urban when the population density exceeds 1,000 persons per square mile, as peri-urban when the population density averages 100 persons per square mile, and as nonurban when the density is less than ten persons per mile (Weier, 2002). Mumford (1956) noted that cities first grew out of the agricultural villages of the Neolithic era. The grains grown (wheat, rye, rice, and maize) in various parts of the world where cities first emerged could be stored from year to year creating the first food surpluses. In turn, those surpluses created new specialized occupations, including philosopher (see Chapter 3), which were impossible in hunter-gatherer or village agriculture lifestyles. Mumford speculated that city walls provided new levels of safety for the inhabitants behind them. Also, because of agricultural surpluses and an increased birth rate, there were enough people to successfully defend the walls from outsiders, the first soldiers. He noted (p. 385) that city walls were also metaphors for growth, "Until modern times the extensions of a city's walls marked its growth as surely as does each additional ring of a tree." Other new innovations were reservoirs, sewers, irrigation networks, and paved roads. Cities provided security, but they also provided social continuity including, "a secure base of operations, a seat of law and government, a repository of deeds and contracts, and a marshalling yard for manpower" (p. 387). Cities revolutionized human history and led to the development and growth of the earliest civilizations (Photo 2.3).



**PHOTO 2.3** World at night

*Credit:* iStock/Elen11



## CIVILIZATION AND THE BIRTH OF HISTORY

Very few humans today live outside of civilization and its all-encompassing influence: laws, money, records, communications, and occupations. In hunter-gatherer groups there are only a few occupational specializations. In contrast, civilization includes hundreds of occupations. The O\*NET OnLine database (US Department of Labor, n.d.) lists almost 1,000 occupations and identifies more than 100 of those as to “bright outlook” occupations including accountants, biostatisticians, and transportation engineers. Additionally, many occupations are labeled as “green” denoting that they are environmentally responsible jobs. Civilization is dynamic with technologies moving from Stone to Bronze, to Iron ages in the past, and to Agrarian, Industrial, and Informational more recently. Modern civilization is moving fitfully toward globalization with universal systems for timekeeping, standardized weights and measures, and worldwide communication. Complete globalization, however, may take centuries and it is possible that forces resisting globalization (e.g., nationalism) may prevent it from ever happening.

### LEARNING OBJECTIVE

5. Predict what new technology or device might be a candidate for global standardization.

### The First Civilizations

The earliest civilizations developed in Central Asia in an arc ranging from the Russian steppes to Mesopotamia. The civilizations traditionally regarded as the oldest, those in Mesopotamia, have not lost their priority. Instead, the research revealed, “a far more complex picture in which dozens of urban centers thrived between Mesopotamia and the Indus, trading commodities and, possibly, adopting each other’s technologies, architectures, and ideas” (Lawler, 2007, p. 586). These early civilizations were characterized by urbanization, writing systems, occupational specialization, and monumental architecture (Rudgley, 1999). They also included laws in place of customs, records instead of oral traditions, and, for the first time, schools. Cochran and Harpending (2009) speculated that the changes caused by living in civilizations were so vast that they led to the evolution of new biological and behavioral traits. Living in close proximity with domesticated mammals and with other humans required genetic changes, they argued. Thus, urbanized populations underwent natural selection for immunity to diseases that can leap from animals to humans and for being able to digest milk as adults. Presumably, people who could better withstand the crowding imposed by densely populated urban environments thrived and reproduced more successfully, thus altering many of the basic genetic characteristics of earlier humans. The COVID-19 virus and other communicable diseases spread more easily in urbanized environments (Figure 2.1).



**FIGURE 2.1 ■ The Early Sites of Civilization**

Other early civilizations developed outside of the central Asian arc. In Eurasia, civilizations arose in Egypt and around the Mediterranean Basin. Further east, civilizations arose in India, China, and Korea. In the New World, civilizations appeared in Mesoamerica and South America. Discussion of these civilizations, however, is outside of the scope of this text. In fact, topics in this text will be limited almost exclusively to the Mediterranean Basin including the Near East and then only to disciplines related to psychology. Once civilizations emerged, the period of prehistory ended. Civilizations created records, and in the process created the raw materials for historians to create history itself.

## BORDER WITH SOCIAL SCIENCE

### EARLY RELIGIONS

Religious thought and activity also appears to date from after the widespread adoption of sedentism. The presence of grave goods, food and tools buried along with the deceased, is evidence that Stone Age humans believed in the existence of an afterlife. The style and practice of early religious thought and activity differs tremendously from its modern forms. Pettitt (2020) distinguished between mortuary and funerary behaviors in prehistoric humans and proposes an evolutionary continuum eventually leading to the symbolic funerary practices of behaviorally modern humans. Gimbutas (1982) characterized early “Old European” religions as possessing several Goddesses and Gods. In her interpretation, the Goddesses, most notably the Great Goddess, were the most important. Gimbutas maintained that these deities represented a cyclical pattern of birth and rebirth and those, along with natural cycles such as the seasons of the year, emphasized the mystery of female fertility. Archeological evidence supports the rise of religious beliefs. Findings include the remains of temples, figurines (most of which are female), and arrangements of large stones. Gimbutas believed

that these older religious traditions were swept away by later arriving groups who replaced them with predominantly male Gods. These new “sky Gods” derived from the sun and moon, required sacrifices of goods and of people, gave rise to the ideas of heaven and hell, and reinforced earlier ideas about the afterlife (Watson, 2005).

## BORDER WITH COMPUTATIONAL SCIENCE

### EARLY ACCOUNTING

Schmandt-Besserat (1996) wondered why tiny clay tokens were so common in archeological sites from all around the Middle East. She soon realized she had discovered an early accounting system. Each token represented the item in a business transaction. After such transactions, the tokens representing the items traded (e.g., lambs, goats, or sheep) were sealed inside hollow clay tablets to keep an accounting of the transaction. Eventually, the tokens became standardized. A cylinder came to symbolize an animal and an ovoid (egg-shaped token), a jar of oil, for instance. The tokens inside the clay envelopes eventually gave way to marking on clay tablets, one of the earliest forms of writing. Later still, early accountants realized that numerals could be divorced from the object they counted. Thus, they came to see that “three” was different from “three sheep.” Numerals could apply to any referent and need not be paired to objects; numerals were abstract.

## THE DEPTH OF CIVILIZATION

Civilization seems akin to the thin veneer covering an uglier layer of material underneath. Wars and the aftermath of natural disasters often act like sandpaper and expose our older uncivilized selves. The war in the Balkans in the first half of the 1990s, particularly the 30-month long siege of Sarajevo, stands out as a clear example of civilization breaking down. At the same time, those events demonstrated much about the resilience and adaptability of our species.

In 1984, Sarajevo had successfully hosted the Winter Olympics making the city well known around the world. So, when war broke out in the Balkans in 1991 after the death of Tito, the events that took place in Sarajevo were all the more shocking. The siege of Sarajevo began in April 1992 and lasted until September 1995. The city was surrounded by Serbian and Bosnian forces perched on the mountains surrounding the city and inside many tall buildings. At the beginning of the siege nearly a half million people lived in Sarajevo and because of the relative lack of habitable space were concentrated into a dense urban environment.

Marshall Tito Boulevard, a wide thoroughfare running east-west through the city contained the only trolley line. Soon, that street acquired a new name, one it still carries today, “Sniper Alley.” Over 1,200 residents were killed or wounded by snipers during the siege; 60 of the killed were children. Another 60,000 were killed or wounded by artillery bombardments during that same period. Many buildings, some of them historic, also were destroyed or damaged. Soon, the very fabric of civilized life began to rapidly unravel. Some called it urbicide.

Food, fuel, and water became scarce. Schools closed and people moved into their basements. Yet, children still played in the streets, barriers against sniper fire were erected, and signs were posted in the more dangerous locations warning against sniper fire. In short, the lifestyle of Sarajevans acquired a kind of normalcy. Imagine a wife calmly admonishing her husband to watch out for snipers as he went to fetch water. Snipers became another fact of life. It seems that civilization is not that deep. It can be displaced by wars, terrorists, hurricanes, tornados, or other similar dire events. But, people adapt quickly to such changes, not that they like or enjoy them. People also forget the past quickly. Tourists now visit Sniper Alley, and many of the bullet marks have intentionally been left unrepaired. A monument to the victims of the siege in the shape of a large tin can of meat, depicting the kind of food delivered by relief agencies, now stands in Sniper Alley reminding all how quickly civilization can be lost (Photo 2.4).



**PHOTO 2.4** Sarajevo Monument

*Credit:* Associated Press

## THE RISE OF PHILOSOPHY

Philosophy and writing were natural partners. For the first time, historians used written records to help convey the story of humankind. Philosophy is part of that story. Because of the great antiquity of those early written records, they may be hard to find, are often undecipherable, and most are irretrievably lost. The nearer to the present, the easier it is to find written records. Philosophy emerged in ancient Greece nearly 3,000 years ago when a small group of thinkers began to wonder if the universe could be explained without resorting to supernatural events or

beings. That story will be examined in the next chapter as will be the ideas raised by these philosophers and why those ideas remain important today. All of those philosophers attempted to eliminate supernatural explanations or entities from the pursuit of knowledge. That effort, in effect, defined philosophy itself—it is the love and pursuit of knowledge.

After philosophy defined itself against the supernatural, other questions arose. One set of questions concerned the physical makeup and workings of the universe, natural philosophy. It eventually led to the physical sciences. The search for first principles was a major early question and modern physical sciences have yet to answer it fully. Physicists today still spend millions of dollars every year searching for the primordial constituents of matter. Another early question was the nature of life or what separated living from nonliving things. In other words, what defines living things? The biological sciences grew out of that question. Biologists still struggle with that answer now when they ask questions such as whether viruses are alive or not.

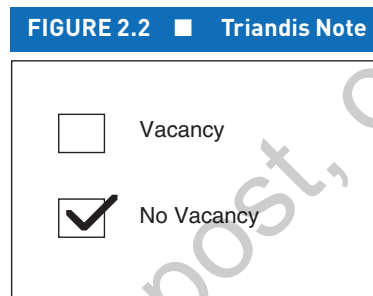
The natural philosophers also struggled with the question of how much to trust sensory data. Indeed, this question has bedeviled intellectual inquiry ever since it was first raised. Early on, philosophers realized that information from the senses was not always reliable. Thus, the problem was to distinguish between reliable and unreliable sensory information. Modern science still struggles with this problem and its methods are, in large part, designed to eliminate or exclude unreliable sensory information. On the other hand, the early rationalist philosophers decided not to trust sensory data at all. They turned their focus from the universe to inside themselves, to their minds.

The dynamism of the universe was another idea explored by these early philosophers. Some argued for change and their philosophical systems reflected that. Others maintained that constancy was a feature of the universe and must be accounted for. Still others sought a compromise between these two extremes and created systems composed of changeless parts that combined and recombined. Modern science reflects that compromise with its laws of conservation on the one hand and its explanations for dynamic processes ranging from evolution to cosmology on the other.

The early philosophers also came up with two long-standing entities that are still very much with us: mind and soul. The mind, in many ways, has become one of the central foci of modern psychology. The soul, too, has survived the long journey from ancient Greece till now. However, the soul is no longer the subject of much psychological inquiry. It is, though, the main subject of nearly every extant religion as is the concept of heaven. Today, in the West at least, the division of mind and soul has become permanent. In ancient Greece, they were still very close to each other.

Many -isms will be examined and defined. Here, a few will be mentioned. Later chapters will cover them more thoroughly. Materialism still remains a powerful idea in modern science. In many ways, it is the Holy Grail of modern science as psychologists search for physical explanations of thought in the brain. Nihilism, monism, and relativism will also be examined. Nihilists, basically, argued that the search for knowledge is impossible, or they argued that even if it were possible, it could not be communicated. So, they asked, “Why bother studying anything?” Monism is more resistant to such easy elimination. Monistic explanations searched for the *one* thing that will explain all of the others. Future chapters will examine a number of plausible monistic formulations (e.g., materialism and idealism) as well as dualistic (two things) and pluralistic (three or more things) formulations.

Relativism, too, is a flourishing hot topic. Culture is a good example. Things that people take for granted as universal may not be so. Triandis related (personal communication, April 1, 1994) how he misinterpreted a simple note in India. He was registered at a hotel and received a note with two words and two boxes. The words were “Vacancy” and “No Vacancy” and the box next to No Vacancy was checked (Figure 2.2). Triandis assumed that his reservation had been canceled and booked another room at an inferior hotel. A couple of days later the manager at the original hotel saw Triandis in the lobby and asked him why he had not checked in yet. Ruffled, Triandis pulled out the note and showed it to him. The manager then said, Yes, we always mark the box that does not apply. He checked in. At the same time, other topics are nearly universal. Perception, for the most part, varies little from person to person around the world. No one with normal vision will argue that the ocean is red. The philosophers raised more questions than they answered. Over time though, the questions kept getting better and some questions did get answered. A look at ancient Greek religion will help set the stage for understanding how philosophy was born.



### LEARNING OBJECTIVE

6. Demonstrate relativistic thinking where a male might interpret a cultural situation differently from a female.

## ANCIENT GREEK RELIGION

Hesiod's *Theogony* and Homer's *Iliad* and *Odyssey* were the most important original Greek sources relating to the origin and extent of Greek religious thought and activity. Unlike the Judeo-Christian and Islamic religious traditions, Greek religion was polytheistic, local, and included no sacred texts. The Greek gods were numerous, male or female, and immortal.

In Hesiod's account, Chaos was the original god, the primordial and eternal being. Chaos gave birth to Gaia (Earth), Tartaros (the Underworld), and Eros (Desire). Gaia, alone, gave birth to Ouranos (Sky), Ourea (Mountains), and Pontus (Sea). Later, Gaia and Ouranos mated to create the 12 Titans. Ouranos, displeased, hid the Titans in the Earth but Gaia did not want them hidden, so she gave the titan Kronos a sickle with which to castrate his father. When

Kronos threw Ouranos's testicles into the sea, Aphrodite, Goddess of love, emerged fully formed. Kronos now ruled the cosmos (or everything), but learned from a prophecy that one of his children would overthrow him. To prevent that fate, he devoured his children as they were born. Rhea his wife fooled him when she gave birth to Zeus, their last child, by giving him a large rock to swallow instead. Later, and without explanation, Kronos vomited up his five other children. They joined with Zeus in a ten-year war that ended with all of the Titans, save Prometheus, locked in Tartaros, the underworld. Afterwards, Zeus married seven times, lastly with Hera. Athena, Zeus's daughter, was "born" directly from Zeus's head, not from Hera. Angered, Hera too gave birth to a son without sexual intercourse, Hephaestus, the god of fire. Eventually, there were 12 major gods, the Olympians (because they lived on top of Mt. Olympus): Zeus, Hera, Poseidon, Demeter, Ares, Hermes, Hephaestus, Aphrodite, Athena, Artemis, Hestia, and Apollo. Three minor but important gods were Dionysius, Pan, and Hekate. In addition to the gods already mentioned there were also numerous nymphs, gorgons, cyclopedes, river gods, and giants.

The Greek city-states worshiped gods of their own choosing. Athens, for instance, worshiped Athena, while Sparta worshiped Artemis. Worship primarily consisted of blood sacrifice of food animals: sheep, pigs, oxen, horses, or birds. Priests or priestesses accepted and killed the animals, consigning the blood, skin, and bones to the god. The meat was roasted and given to the worshipers. The god's sanctuaries contained an altar for sacrifices and were nearly always outdoors and oriented east (Mikalson, 2004).

The gods themselves were human-like, powerful, and immortal. However, the gods were not *all*-powerful. In the *Iliad*, for example, Apollo could not save Hector from death; fate had already doomed him to die at Achilles' hand. Even the gods were powerless against fate. They fought and plotted among themselves as well, thus giving humans a wide variety of divine examples for their own behavior. Robinson (1981, p. 36) noted, "for almost any form of conduct, a divine example could be found with relative ease." Robinson linked Dionysius and Apollo as examples of emotion and reason, respectively, a distinction that eventually crossed over from mythology into psychology.

It was against this backdrop of Greek religion that the first philosophers began to ply their trade. The birth of that new discipline, philosophy, took place during the Archaic Age (800 to 479 BCE) in Ionia (present day Turkey). Although these new philosophers sought naturalistic explanations for the universe, they did so against the backdrop of these religious ideas. The death of Socrates followed by Plato's seeming reluctance to venture deeply into cosmology and theology testified to the tension between early philosophy and Greek religion (Robinson, 1981). Another early Greek advance was in medicine. Its origins were empirical but, over time, they devolved into received and traditional knowledge. Medicine did not regain its original empirical roots until well into the modern era.

### LEARNING OBJECTIVE

7. Interpret why humorism had such a long life in the history of medicine.



## GREEK MEDICINE

Greek medicine was another original Greek contribution to civilization. Like philosophy, Greek medicine had shed its early mythological roots. Unlike philosophy, however, medicine evolved into an empirical practice. Alcmaeon was an early writer and teacher of the medical arts. Hippocrates was among the first persons to emphasize the natural nature of disease and firmly reject supernatural explanations for illness. Galen, who lived hundreds of years after Hippocrates, collected and published the corpus of ancient Greek medicine and added his original knowledge to it. Hippocrates's medical writings became the basis of Western medicine for over 1,000 years after they were systematically organized and made popular by Galen nearly 500 years after Hippocrates's death.

### Alcmaeon (dates unknown)

No one knows exactly when Alcmaeon lived, but he was probably born sometime between 540 and 510 BCE. He was born in Croton, in *Magna Graecia*, and lived there at the same time as Pythagoras with whom he was likely acquainted. However, he was probably not one of his students or followers. It is not clear whether Alcmaeon was a practicing physician or a naturalistic philosopher. During his lifetime, however, Croton was famous for the skill of its physicians (Photo 2.5).



PHOTO 2.5 Alcmaeon

Alcmaeon wrote one book, *On Nature*, of which only fragments survive. In that book he argued for a naturalistic view of human beings and rejected revelation as a source of knowledge. He proposed several original ideas about humans and animals. Both, he thought, could perceive the world but only humans could take the next step, understanding what they perceived. He placed the mental faculties of both in the brain and made it the home of vision, hearing, taste, and smell. Through dissection, he discovered that the eye had a connection (the optic nerve) with the brain. That discovery led him to infer that the ear, tongue, and nose must also have similar connections. However, there is no evidence that he conducted further dissections to confirm his hypotheses. Also, he never mentioned the sense of touch in his extant writings.

His medical theories were based on the balance or imbalance of opposites. Health, he believed, was related to a balance between factors, while disease was caused by an imbalance or what he called a “monarchy” of one of the factors. Huffman (2008) saw Alcmaeon as influential for three reasons. The first was naming the brain as the seat of intelligence. The second was his empiricism and the third was his argument for the immortality of the soul. Alcmaeon was the first to suggest that the soul was immortal and likely an inspiration for Plato's later thinking about the nature of the soul. He also placed the seat of human faculties in the brain, not the heart. Later, Aristotle (see Chapter 3) moved it back. Panegyres and Panegyres (2016, p. 21) stated:

The ancient Egyptians maintained that the heart was the place of mind [5]. Some Greek philosophers questioned this view and developed concepts implicating neurological



localisation. Alcmaeon, Praxagoras and Herophilus promoted this cerebrocentric view, which was shared by Hippocrates, only to be later rejected by Aristotle who promoted a cardiocentric model.

The Greek physicians began a tradition that was steeped in empiricism but one that did not survive antiquity. From Alcmaeon on, they observed and collected vast volumes filled with facts about the body and disease. The most famous of these physicians was Hippocrates. His medical discoveries lasted for millennia but the methods he used to find them fell into disuse by the early Middle Ages. Thus, medieval physicians no longer applied empirical methods to medicine either to discover new facts or confirm or reject old ones. Hippocrates himself would have gladly rejected any of his previous findings if they had later been shown to be incorrect. Unlike the medieval physicians, he was a true empiricist.

## Hippocrates (460–377 BCE)

### Biography

Hippocrates was born on the island of Cos (modern Kos, Greece). His father and grandfather were also physicians. Hippocrates learned medicine but also studied philosophy with Democritus and Gorgias. There are many extant writings attributed to Hippocrates. However, they cannot all be his because they exhibit different writing styles and are often contradictory. Writers after Hippocrates appropriated his name in order to lend credence to their own works. Hippocrates is known as the “father of medicine” because he strongly rejected supernatural explanations of illness and disease; the Hippocratic writings (the Hippocratic Corpus) never mention such causes. Hippocrates lived to an old age, traveled widely throughout Greece, and was well known and respected during his lifetime (Photo 2.6).

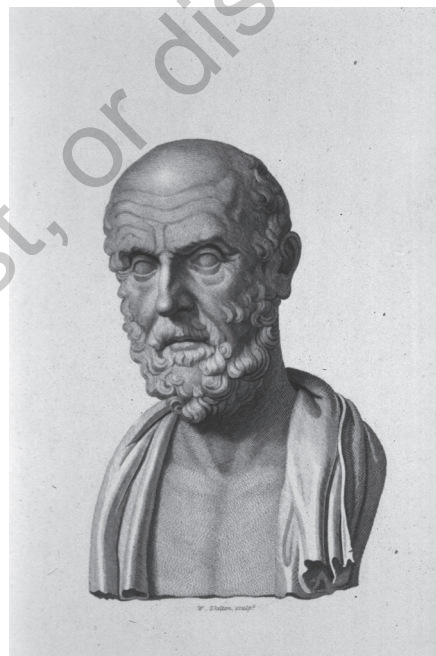


PHOTO 2.6 Hippocrates

### Contributions

Hippocratic medicine was mostly centered on clinical care and prognosis. Hippocrates recommended that patients be kept clean, treated gently, and brought back to health using natural means. He believed the body could cure itself and that the physician’s job was to aid that process. He defined health as a balance of the four humors, internal fluids he believed were vital to well-being. When the humors were out of balance, illness resulted. The four humors were: blood, black bile, yellow bile, and phlegm. The humors, in turn, were linked to the four Greek elements: blood with air, black bile with earth, yellow bile with fire, and phlegm with water. Medical practice from Hippocrates on was dominated by **humorism**, which was not completely

discredited until the 19th century. In that system, those with an excess of blood were called sanguine; their personalities and behaviors were hopeful, cheerful, and spirited. Those with too much black bile were melancholic or depressed. Those too full of yellow bile were irritable and grumpy. Those with an excess of phlegm were apathetic and unemotional. Galen and the later Arabic physicians greatly amplified and expanded humorism. Hippocrates was one of the first to diagnose a phobia, describing how a patient, Nicanor, had developed an irrational fear to flute music played at night (Crocq, 2015).

Hippocrates was also well known for his Hippocratic Oath. However, it is not clear that he actually wrote it. Nonetheless, the language of the oath is clear and uncompromising. Physicians should never do harm, administer poison, induce abortions, have sex with their patients, or violate confidences. It is a remarkable document and is the historical basis for modern codes of professional ethics.

Hippocrates's influence on later developments in medicine was paradoxical. Later physicians failed to adopt his empirical methods but held on to the findings Hippocrates and his successors had discovered using those methods. The effect was to halt and reverse the progress of medicine for over 2,000 years. Hippocratic thinking also had little effect on later philosophy. As philosophy became less concerned about the natural world and more concerned about the Platonic Forms, Hippocrates's empirical methods and observations fell into disfavor. By the time that Greek philosophers regained an interest in the natural world, the separation between them and their contemporary medical practitioners was too great to rekindle a synthesis. Robinson (1981, p. 69) stated, "Hippocrates and his followers come closer to the modern spirit of experimental science than perhaps any figure in antiquity." This ancient high water mark of scientific progress would not be regained until the Enlightenment. The knowledge about Hippocrates and of the Hippocratic tradition largely comes from the work of a physician who lived hundreds of years after him, Galen. He not only preserved that knowledge and tradition, but he also added greatly to it.

## Galen (129–210 CE)

### Biography

Galen was a Greek physician from Pergamum (modern Bergama, Turkey). His father, Nicon, was an architect and educated his son until he was 14. Nicon wished for Galen to become a philosopher. But after a dream, he relented and allowed Galen to study medicine. After completing his medical studies in Pergamum, Galen traveled extensively and studied in Smyrna (modern Izmir, Turkey), Corinth, and Alexandria. He returned to Pergamum and became the physician to gladiators, learning much about human anatomy in the process.

### Contributions

Later, he moved to Rome where he soon became famous as a physician, catching the eye of the emperor, Marcus Aurelius, and eventually becoming his personal physician. As a prolific writer, Galen documented his work. Unfortunately, much of it was destroyed in a fire in 191 CE. Enough of his writings survived to cement his position as the most prolific collector of

the ancient world's medical knowledge. Much of his extant work is now being translated into English (Singer & van der Eijk, 2019).

Galen, however, was more than a collector of ancient medical lore. He added much to the body of ancient medical knowledge. He dissected animals and was the first to describe how muscles worked in opposing pairs. He severed the nerves of living animals in order to infer their functions. He experimented by tying off the ureters of animals and observing the subsequent swelling of their kidneys. He failed, however, to accurately describe the circulation of blood, believing that arterial and venous flows were independent of each other. Because he could not legally dissect human cadavers, he mistakenly inferred the existence of anatomical structures nonexistent in humans. For example, he thought that humans possessed a *rete mirabile*, a complex vascular network associated with heat exchange in certain animals (e.g., cows, tuna, and some birds). Humans, it turns out, do not possess that anatomical structure. After Galen's death, his discoveries, like those of Hippocrates and Aristotle before him, were canonized by the Roman Church. Thus, his unchallenged ideas about anatomy persisted well into the Enlightenment.

Perhaps because of the early influence of his father, Galen believed that physicians should receive a well-rounded education, especially in philosophy. He also believed that physicians should not enter the profession in order to become rich. Medicine, thus, through the work of Hippocrates and Galen, progressed quickly early on in its history, only to stagnate for over 1,000 years.

## SUMMARY

It is nearly impossible to form a clear picture of what humans were like before they began to keep written records. What those prehistoric peoples thought and did cannot be understood using methods requiring living participants. However, as cognitive archeologists and others have shown, inferences about their thinking and behavior can be made by the careful analysis of ancient artifacts, akin to Wundt's *völkerpsychologie* (Kardas & Henley, 2020). That part of Wundt's psychology explored language, myths, customs, and other similar areas in a manner very different from laboratory psychology. Wundt, likely, would find this chapter necessary for a complete understanding of psychology. Biologically, however, the picture is clearer. Most likely, members of the species *Homo sapiens* are more similar to each other than different, at least over the last 50,000 years. Culturally, much has changed over the last 15,000 years. The human species has multiplied exponentially and has transformed much of the Earth through technology and radically changed its demography with most now living in large cities and subject to conditions of crowding scarcely imaginable in the past. Narvaez (2020) urged us to see outside our fishbowl and consider the restraints that civilization has imposed: a foreshortened view of humanity, a negative view of human nature and prehistory, biases against individualism and towards abstraction, and a misunderstanding of human potential. She stated (p. 113), "Understanding where we have been can help us figure out how to move forward." People could learn much about how to live and prosper in partnership with the environment

she argued; the San Bushmen, for example, have maintained such a balance with nature for over 150,000 years. People should understand that civilization is very new and it profoundly altered older lifeways. Only some 7,000 years ago did civilizations begin to appear and create surpluses of goods and job specialization. One of those specializations was philosophy, an essential part of any civilization and the mother of nearly every other academic discipline including psychology.

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