

coasts. (See map, page 254.) Caravans traveling the trade routes that connected India and China with the Byzantine Empire, stopped at cities like **Mecca**, near the Red Sea. It was in Mecca that Muhammad was born around 570, and it was to Mecca that he returned triumphant in 630. Mecca became a holy city for **Muhammad**, the prophet of Islam, and for his followers.

### **Muhammad became the messenger of God and the prophet of Islam.**

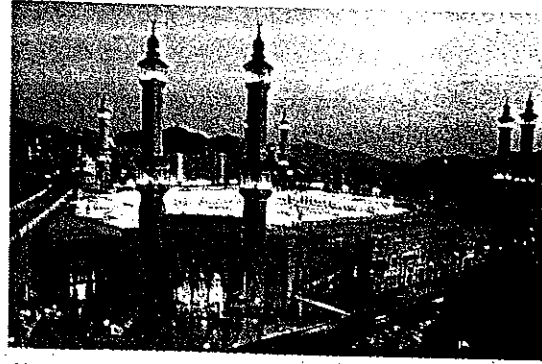
Muhammad's father died before he was born, and his mother died when he was six. Raised by his uncle, a respected Meccan merchant, the young Muhammad went to work for a wealthy widow named Khadija [kā dē'jā], who owned several caravans. Muhammad traveled with the caravans, seeing to the affairs of his employer. He met many people in his work, among them monotheistic Jews and Christians with whom he spoke about the concern of his heart, the oneness of God.

Khadija's respect and love for Muhammad grew until one day she asked him to marry her. She was 40 years old and Muhammad was 25. They were very happy together, eventually becoming the parents of four children. His marriage freed Muhammad from financial worries, but more important, it gave him the time he needed for meditation.

When Muhammad was about 40, he had visions in which God spoke to him through the Angel Gabriel. Muhammad was called to be the messenger or prophet of the one true God, named Allah in the Arabic language. According to his vision, although God had sent many messengers into the world, from Adam to Abraham to Moses to Jesus, Muhammad would be the last of them, the prophet of **Islam**, preaching submission to God. "Islam" means "submission to God."

As Muhammad's teachings became more widely known, the wealthy merchants who dominated Mecca feared that his preaching against idol worship would drive pilgrims away from the Kaaba. The Kaaba, a cube-shaped building in the middle of Mecca, housed a sacred black stone and the idols of several hundred tribal gods. Every year thousands of Arabs made pilgrimages to the Kaaba, contributing enormously to the income of local merchants. Suspicious that Muhammad was

**BACKGROUND** Arabic-speaking Christians and Jews also call God Allah.



Above is the Sacred Mosque of Mecca. Within its courtyard is the Kaaba, Islam's holiest shrine.

also trying to become ruler of Mecca, the Meccans began to persecute him and his few followers.

In 622, at the urging of the city of Medina, Muhammad left Mecca for the safety of Medina. (See map, page 254.) This journey, the **Hijra**, is so important to Muslims that it marks the beginning of the Muslim calendar, just as the birth of Jesus signals the beginning of the Christian calendar.

Muhammad was both political and religious leader in Medina. With converts from the surrounding Bedouin tribes, he formed an army and launched a successful campaign against his enemies. In 630 he returned to Mecca in triumph, purging the Kaaba of its idols and dedicating it to God. Before his death in 632, Muhammad saw Islam spread to most of Arabia.

### **Muhammad taught the Five Pillars of Islam.**

The essence of Islam is contained in a single statement, "There is no God but God, and Muhammad is the messenger of God." Islam is a monotheistic religion like Judaism and Christianity and shares many of the same principles. Parts of the Old and New Testaments are revered by Muslims, and Christians and Jews are called "the Peoples of the Book," meaning they also have received a revelation from God.

God's revelations to Muhammad were written down in the **Koran**, the Muslim holy book. Because the Koran contains the inspired word of God, spoken to Muhammad in Arabic, Muslims insist that only the Arabic words of the Koran be used for the formal prayers of worship. Use of Arabic in prayer accounts for its spread to many areas of the Middle East.

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## From the Archives

### Allah the Creator

*The Holy Koran, the sacred book of the Muslims, was revealed to Muhammad over a period of 22 years. It has 114 chapters, called surahs. The following verses describe the power of Allah as the creator of heaven and earth.*

Allah is He Who raised the heavens without any pillars that you see, and He is firm in power and He made the sun and the moon subservient [to you], each one pursues its course to an appointed time; He regulates the affair, making clear the signs that you may be certain of meeting your Lord.

And He it is Who spread the earth and made in it firm mountains and rivers, and of all fruits He has made in it two kinds; He makes the night cover the day; most surely there are signs in this for a people who reflect.

The Koran teaches the five duties of a good Muslim. These duties are called Islam's **Five Pillars**. The first and most important duty or pillar is to make the testimony of faith. To say, "There is no God but God, and Muhammad is the messenger of God," makes one a Muslim. The second duty is to pray five times daily, facing toward Mecca. Giving money to the poor is the third, and fasting during the daylight hours of Ramadan, the holy month, is the fourth duty. The fifth duty is to make a pilgrimage to Mecca at least once in one's lifetime if one is able. For those who cannot make the pilgrimage, it is enough to want to go.

In addition to describing what good Muslims ought to do, the Koran prohibits certain actions. Worshipping idols, eating pork, drinking liquor, and gambling are all strictly forbidden.

The Koran teaches about life after death. The faithful will be rewarded with the eternal joys of heaven, but the wicked are condemned to the fires of hell. The Koran says that believers will be:

**FROM THE ARCHIVES** The excerpt is from the Holy Qur'an (Flushing, New York: Tahrike Tarsile Quran), Surah XIII, verses 2-4, p. 227. The last line of this passage makes it emphatic that believers are to look for signs in the text. In this context,

In a high garden  
Where they hear no idle speech,  
Wherein is a gushing spring,  
Wherein are couches raised  
And goblets set at hand  
And cushions ranged  
And silken carpets spread.

According to the Koran, those in hell will be:

Toiling, weary,  
Scorched by burning fire,  
Drinking from a boiling spring,  
No food for them save the bitter thorn-fruit  
Which doth not nourish nor release from hunger.

### Islam unified various peoples into one civilization.

Because Muhammad taught that every believer is equal to every other believer, there was little racism in the Muslim world. Arab, African, Asian, and European converts mingled freely in the mosques and marketplaces. Christians and Jews who lived in Islamic communities paid a special tax and at times were forbidden to hold public office. However, at other times they might wield the power of adviser to the caliph, depending on his mood. The ancient Arab custom of slavery continued, with polytheists—those who worshiped many gods—the ones most frequently enslaved. One Muslim could not enslave another, however, and it was considered virtuous to free a slave. In practice, however, Arab rulers depended on large numbers of slaves.

Muslim women were equal to men in the sight of God, but within the social context of Arabia, it was a man's world. Muhammad limited men to four wives, an improvement over pre-Islamic times when there was no limit. Although Arab customs dictated that women's activities be restricted to the home, many Arab women were extremely influential in their communities. It was only necessary that a woman arrange for a man to act as her agent in public business. According to Islamic law, any property a woman inherited was hers to use or dispose of as she pleased. Moreover, a woman was absolute mistress of her home; a husband considered himself a guest in his wife's house.

No organized or privileged priesthood as such has ever existed in Islam, because Islam teaches

what are some synonyms for the word "signs"? (symbols, Divine manifestations, prophecies, omens, forewarnings, clues, signals, lessons, examples, etc.)

that no human can intervene between God and another person. There are learned teachers, called *ulema* [ü'lə mä], who explain religious doctrines and an *imam* [i mäm'], who leads group prayer, but there are no priests.

Saying the noon prayer together in the **mosque** [mosk] on Fridays, the holy day of Islam, is especially desirable. Mosques are the churches of Islam, a place of prayer and study. Some mosques are simple circles of stones, but others are immense open spaces within a walled enclosure, furnished with fountains and beautiful tiled walls. Most mosques have a minaret, a tower from which a *muezzin* [myü ez'n] makes the call to prayer five times a day. Today minarets have loudspeakers, but the call to prayer is still the same chant it was 1400 years ago:

God is most great!  
I testify there is no God but God.  
I testify that Muhammad is the Messenger of God.  
Come to prayer;  
Come to salvation;  
God is most great!  
There is no God but God.

## 2 Muslim Arabs conquered a huge empire.

Muhammad was both a religious and political ruler of Medina, Mecca, and much of the Arabian peninsula. In this theocratic state, he governed according to the laws and values that became the *sharia*, the law of Islam. The *sharia* deals with all areas of life, including trade, inheritance, taxation, and such military matters as war plunder and prisoners. The Prophet controlled an army, negotiated

peace treaties with surrounding peoples, and judged disputes according to the law of Islam.

In response to Muhammad's command to spread the faith, his successors led Arab armies in a series of conquests after his death. A growing population's need for new lands to settle spurred the Muslims on. Within 100 years of the Prophet's death, most of the peoples from Spain through North Africa to western India were living under Arab Muslim rule. The map on this page shows the rapid expansion of Islam.

### The Arabs ruled many kinds of peoples.

When Muhammad died, Abu Bakr, his companion on the Hijra, was elected **caliph** [kä'lif], which means successor of the Prophet. Muslims swore obedience to the caliph because he upheld the Koran and the *sunna*, the teachings of the prophet. In continuing Muhammad's work of spreading the

3  
faith, the caliphs pushed out into the areas surrounding Arabia.

The spread of Islam has been linked with *jihad*, an Arabic word which means "struggle," but which is usually translated "holy war." The early Muslims took very seriously their responsibility to convert everyone to Islam and considered the struggle to convert people a "holy war" against polytheists and those who had no faith at all. In modern times *jihad* has been distorted by certain Muslims who tend to call any religious or political movement a "holy war."

Religious fervor was only one reason for Arab expansion. Another reason was a population explosion. The Arabian deserts could not support large numbers of people, and when the prosperity of the caravan trade and the Meccan markets generated a population increase, an intolerable strain was put on the land's resources. New areas were needed for settlements and new peoples waited for the message of Islam. The Arabs turned to their immediate neighbors.

The weaknesses of their neighboring states—the Byzantine and Persian empires—contributed to the early success of Arab armies. The Byzantines and Persians had been fighting each other for centuries, and the conquered peoples in these two empires were tired of the warfare and heavy taxes. They put up little resistance to the Arabs, even welcoming them for the better government and treatment that was becoming the hallmark of Muslim rule.

One of the first places the Arabs attacked was Syria, at that time an important part of the Byzantine Empire. (See the map on the facing page.) Damascus, its capital, was easily conquered in 635, and from Syria the Arabs moved southward into Palestine and Egypt. From bases in the Nile River Valley they spread into North Africa, claiming the land for Islam. Trace their route on the map on the facing page.

Other Muslim armies moved northeast into the Persian Empire and conquered Iraq. They repeatedly defeated the Persian army, and within 10 years of Muhammad's death, they had destroyed the Persian Empire altogether.

The caliphs soon needed to establish rules for the treatment of conquered peoples. Those who fought back were treated more harshly than those who surrendered without bloodshed. Non-Arab polytheists were usually killed and their children enslaved because nothing was worse to a Muslim than the worship of many gods. Jews and Christians were given the choice of either becoming Muslims or paying special taxes. Muslims considered Jews and Christians misguided but protected them because they worshiped the same God under a different revelation. Muslim cities had large Jewish and Christian populations who paid their separate tax and who had to obey certain restrictions. As time passed, many Jews and Christians converted to Islam, even though non-Arabs were treated as second-class citizens. After the first 100 years of the empire, however, non-Arab Muslims assumed the same status as Arab Muslims when Muhammad's teaching of equality was gradually extended to all believers.

### The Umayyad dynasty increased Arab lands.

The first four caliphs elected by the Muslims in Mecca had all been close companions of Muhammad. The expansion of Muslim territory, however, yielded a new kind of ruler. The Arab generals and governors of the new provinces had become more powerful than the caliphs in Mecca. In 661 the Arab governor of Syria declared himself caliph and made **Damascus** his capital. The new caliph founded the **Umayyad dynasty** [ū mī'yad] and a caliphate which lasted until 750. Under the Umayyad caliphs, the Islamic Empire was born.

As you read the following paragraphs, follow the action on the map on the facing page. Along the northwest coast of Africa, in modern Morocco, Algeria, and Tunisia, lived the Berbers, nomadic tribal peoples. Under Umayyad leadership, Arab armies moved into this area, conquered the Berbers, and converted them to Islam. Then, in 711 a combined army of Arabs and Berbers, led by the able Berber commander, **Tarik**, crossed the Strait of Gibraltar into Spain and crushed the Christian Visigothic kingdom there, establishing Muslim rule. The next step took the Muslim army across the Pyrenees [pir'ə nēz] Mountains that form the border between modern Spain and France.

The southwest area of France was a Christian land whose people feared a Muslim conquest. The Muslims pushed hard into their country, marching far into central France. In 732 the Frankish general Charles Martel, grandfather of Charlemagne, defeated the Muslims at Tours in a decisive victory. (Check the map to see how far north into Europe the Muslims went.) The battle of Tours is a landmark event, marking the end of Islamic hopes to conquer western Europe. Muslim rule in Spain, however, continued for more than 700 years.

The people of mixed Arab and Berber ancestry known as **Moors** gave their name to the Moorish civilization of Spain. During the late Middle Ages, Moorish Spain was an important influence on Christian scholarship.

During the golden age of Muslim culture, from 900 to 1100, European scholars went to the great cities of **Cordova** and **Salamanca** to learn Arabic mathematics, medicine, and science. There, too, they studied Arabic translations of Plato, Aristotle,

and other classical Greek authors whose writings the Arabs had preserved. Through the Moors, Greek learning directly reentered Europe after centuries of neglect. Islamic influences, especially in art, architecture, and music, are still strong in modern-day Spain.

The farthest east the Islamic Empire extended was the region of **Sind** in present-day Pakistan. In the first century of Islam, Arab armies conquered Kabul, capital of modern Afghanistan, and then captured Sind. By 724 Arab governors ruled these regions directly as the caliph's representatives. The people were converted to Islam and remain Muslims to this day.

The Arabs repeatedly attacked Byzantium's capital, Constantinople. In the famous siege of 717-718, Constantinople successfully held off the Arab navy by stretching a huge chain across the narrow entrance to the harbor, the Golden Horn, as well as by using their deadly Greek fire, an inflammable

liquid made from a secret formula. The Umayyads were never able to conquer the city.

For many centuries, the Pyrenees Mountains in the west and Constantinople in the east formed boundaries between Islam and Christendom. The Indus Valley separated the Islamic and Hindu worlds. By the end of Islam's first century, the Islamic Empire extended over vast numbers of peoples who represented many cultures, languages, and religions.

### 3 Disputes over leadership troubled Islam.

Most Muslims accepted the Umayyad caliphs as rulers of the Islamic community and empire. As you learned earlier, these Muslims were called **Sunnis**, those who followed the *Sunna*, the example and teachings of Muhammad. Today 90 percent of the world's Muslims are Sunnis. In Iran and part of Iraq, however, **Shiites** are a majority. This division dates to the early days of Islam.

#### Shiites are a minority sect who follow Ali.

When the Umayyads became caliphs in Damascus, some Muslims refused to accept their rule. They believed that the ruler should be a member of Muhammad's family. The Umayyads had won power by claiming that the fourth caliph, Muhammad's son-in-law Ali, was a poor leader and defeating him in battle. Ali was assassinated, but his followers persisted, forming the Shiites.

The Shiites believe that God chose the Prophet's family to be the leaders of the Muslim community. This family included Ali, the son-in-law of Muhammad, his wife Fatima [fə tē'mə], Muhammad's daughter, and their two sons. After Ali's death the Shiites gathered around Ali's son, Hussein, and declared him their caliph. In 680, at the battle of Karbala [kar'bə lə] in present-day Iraq, the Umayyad caliphs defeated the rebels. Hussein was killed, and his severed head was sent to Damascus as a sign of victory.

Although defeated, the Shiites found inspiration in Hussein's martyrdom. They still mourn his death in passion plays that reenact Karbala, and at his grave there is a pilgrimage shrine.

Because Shiites never regained the office of caliph, Shia Islam attracted political dissidents who felt oppressed by the government. Shiites supported Ali's descendants secretly through 12 generations, and when the 12th Shia caliph, or imam, disappeared one day during prayers, they said he was deliberately hiding. Shiites believe he will return to this world when needed to lead his followers to victory.

Shiites believed other things that were at odds with mainstream Islam. For instance, they thought

that Ali's descendants had divine power to guide people and interpret the Koran. As time went on, not all Shiites agreed with each other on these interpretations, nor on who were the rightful descendants of Ali. Thus the Shiites themselves split into several groups. The Fatimids, the Druse, the Alawi, and the Assassins are some of the best known. Their beliefs and ritual were often kept secret so that they could not easily be persecuted.

About the year 1000, Turkish nomads from Central Asia migrated into Abbasid Persia. Seljuk, one of their chieftains who converted to Islam, led the tribes that became known as the Seljuk Turks. They served as soldiers for the Abbasids and were so powerful that before the end of the century they dominated the world of Islam from the Mediterranean to China.

### **Seljuk Turks ruled the empire during the crusades.**

In 1055 the Seljuk Turks invaded Baghdad. At first they were only interested in warfare. However, the Seljuks appreciated the high level of Abbasid civilization, and under their patronage, Baghdad continued to be the center of eastern Muslim culture for another 200 years. The Seljuk rulers did not depose the Abbasid caliphs. Instead they took the title **sultan**, meaning "ruler" in Arabic. Although the caliphs continued to reign, the sultans were the real powers in the empire.

The Seljuk armies attacked Byzantine holdings in Asia Minor, dealing the Greeks a major defeat in 1071 at the battle of Manzikert. As a result, all of Asia Minor was opened to Turkish conquest. These Seljuk advances prompted the First Crusade. As you will recall from Chapter 11, both religious and economic reasons fueled the crusades. Christendom watched with dismay when Seljuk governors harassed pilgrims to the **Holy Land**, the parts of Palestine where Jesus lived and died. When Seljuk armies swept into the Byzantine Empire, the Byzantine emperor begged the pope and princes of western Christendom for help in recovering both the Holy Land and his lost provinces, promising to share with them the riches of Constantinople if the Crusader's Cross were not reward enough. He never dreamed that 200 years later crusaders would indeed "share" his city's wealth in their murderous sack of Constantinople.

The First Crusade was the most successful because the Seljuks were taken by surprise. By 1100 Latin Christians had established several Crusader States in Syria and Palestine.

Muslims were shocked by the barbaric conduct of the Christian conquerors, all of whom they called Franks since so many came from France. They watched the crusaders slaughter not only Muslims, but Jews and Arab Christians as well. Unable to understand Arabic, and convinced that everyone in sight was an enemy of Christ, the crusaders killed friend along with foe. The crusaders' eating habits, bathing customs, and medical practices especially disgusted the civilized Muslims. Over time some crusaders acquired some scientific and technological skills from Islam, as well as some food and clothing preferences. Eventually, they carried these discoveries back to Europe where they improved European culture.

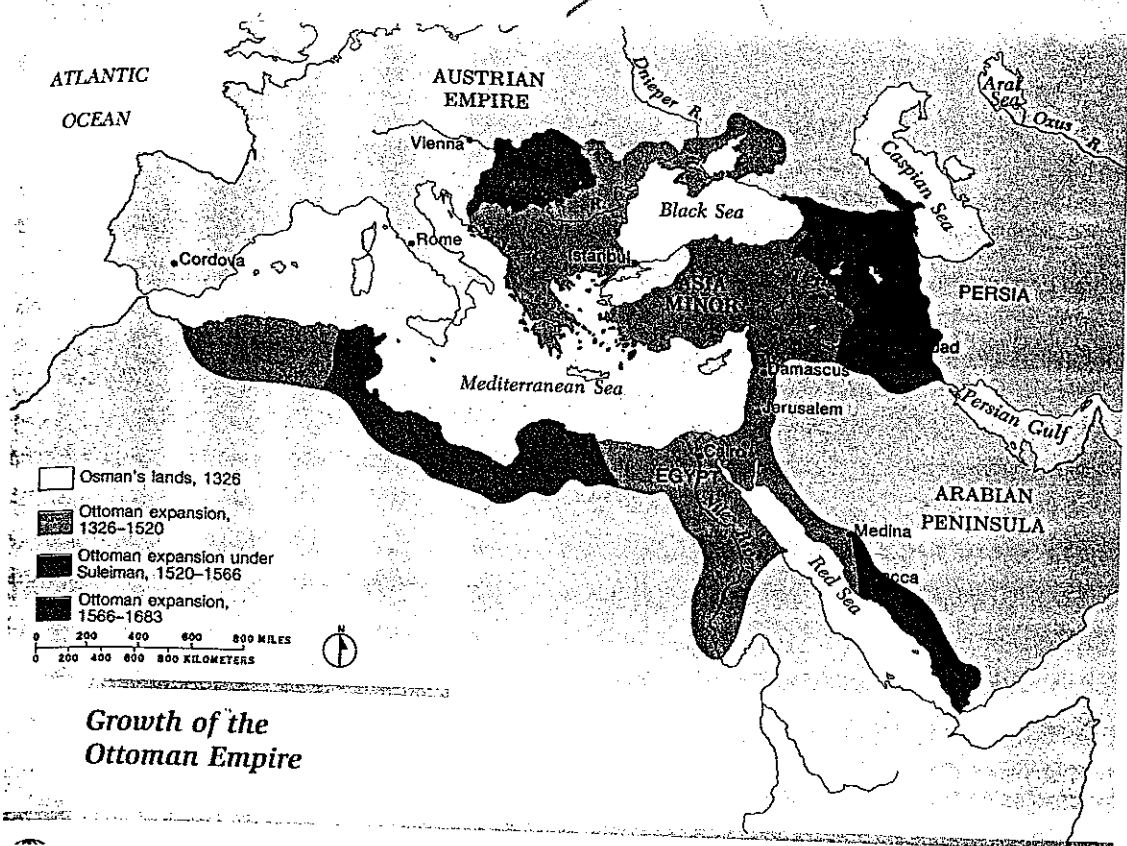
By 1150, just as Islam began to rally against the invaders, the Seljuks fell to quarreling among themselves. The sultan's principal minister, known to the West as **Saladin** [säl'ə dən], waited through the dying days of the last Fatimid ruler, then seized the throne. One historian says that he "kept the sultan fully uninformed, that the wastrel might die in peace!" From his power base in Egypt, Saladin, one of history's most competent rulers, prepared to recover his land from the Europeans.

In 1187 Saladin attacked the Crusader States and recaptured Jerusalem. The stunned West then launched the Third Crusade, called the Kings' Crusade after the three famous medieval monarchs who led it: Frederick Barbarossa of Germany, **Richard the Lion-Hearted** of England, and Philip Augustus of France. Frederick drowned swimming a river in Asia Minor without ever setting foot in the Holy Land. Philip, furious that Richard refused to yield him the leadership of their combined forces, went home. Only Richard of England was left to uphold the honor of Christendom.

Saladin and Richard eventually signed a ten-year truce allowing pilgrims safe access to Jerusalem, a concession Saladin had been prepared to grant from the first, before all the bloodshed. By the time of his death in 1193 Saladin had nearly destroyed the Crusader States in the East.

### **Mongol invaders devastate the Islamic Empire.**

In the mid-1200s, the Mongol Genghis Khan stormed into the Middle East, devastating lands



**Growth of the Ottoman Empire**



**MAP STUDY**

The Ottoman Empire grew from the lands controlled by Osman in 1326. What lands did Osman control in 1326? During which years did the Ottoman Empire make its greatest territorial gains?

that have not recovered to this day. When Genghis Khan's grandson, Hulagu, sacked and burned Baghdad in 1258, more than 100,000 citizens and their caliph were massacred. The Muslim world was shattered. With the end of the Abbasid dynasty, there would never again be an Arab caliph.

Millions of people in central and western Asia were killed during the Mongol invasions, and pyramids of their victims' skulls were left behind to frighten those who survived. The Mongols destroyed mosques and libraries. They also destroyed the vast network of irrigated farmlands that had fed the population of Mesopotamia since the dawn of history. This region, present-day Iraq, only began to revive in this century.

When the Mongols rampaged through the Muslim world, much of Islam's cultural heritage was

lost. A powerful mercenary army in Egypt, called the Mamluks, stopped the Mongols from advancing westward but they then turned back eastward to terrorize Iraq and Persia for many decades. Gradually, descendants of the Mongols became Muslims and were assimilated into the populations of Southwest Asia.

**Ottoman Turks champion Islamic civilization.**

The Muslim Turks in Egypt, Syria, and Asia Minor conserved many cultural achievements of the Islamic world. Once the vassals of the Seljuks, around 1300 the Ottoman Turks conquered lands in Asia Minor on the edge of the weakened Byzantine Empire. After repeated attacks, the Ottomans gained control of much of Asia Minor.

In 1453 the Ottoman Turks did what the Arabs had tried to do for 750 years: they captured Constantinople. Stopping long enough to change the city's name to Istanbul, the Ottomans pressed on into southeastern Europe, eventually taking what is known today as Hungary, Yugoslavia, Romania, Greece, Albania, and Bulgaria.

The Ottomans then turned to conquer and reunite the Muslim lands of the Middle East. By 1500 they were poised to provide the Islamic world with the kind of unified leadership it had not known for centuries. They also were ready to threaten western Christendom as it had not been threatened since the Arab conquests of the 7th century. You will read about the military, political, and cultural successes of the Ottomans in Chapter 23.

**Cities enjoyed a high standard of living.**

City life in the Islamic Empire in the period between 700 and 1200 was far more developed than in western Europe at that time. The heavily populated and well-planned Muslim towns had fountains, libraries, teeming markets, and efficient drainage systems, some of which still function today. In the year 1000, Baghdad, the capital of the empire, had a population of more than 1 million. **Cairo**, founded by the Arabs in 969, grew to more than 150,000 people in 50 years. These and other cities flourished in sharp contrast to the smaller, less healthy wooden towns and crude, cold stone castles surrounded by serfs' and peasants' huts in Europe at that time. In the year 1000, the European manorial economy could not support large urban centers, and only three or four European towns had reached a population of even 25,000.

The Islamic Empire's prosperous economy contributed directly to the good health of its citizens. As a result of extensive agriculture and irrigation projects, people could choose from a large variety of fruits and vegetables for their tables. The common people as well as the aristocracy enjoyed some leisure time. They often spent it listening to lute players or poetry recitations. Public coffeehouses and restaurants for men and special hours at the public baths for women were opportunities for meeting friends. At a time when many Europeans did not bathe once in a whole year, the city of Baghdad had 1,500 public baths.

**2** *Vigorous trade spread Islamic culture.*

Unlike many Christians in western Europe in the Middle Ages, Muslims considered trading to be an honorable profession. Throughout the Islamic Empire, commerce was a bigger business than either industry or agriculture.

**Many factors encouraged the business of trade.**

Within the empire no trade barriers, such as taxes or import duties, existed between regions. In contrast to Europe, where most people depended on barter, in Islamic lands gold and silver coins were used in trade, and every market had its money-changer or moneylender. Business terms such as tariff, traffic, check, bazaar, and caravan came into the English language from Arabic.

A complex banking system developed in the Islamic world three centuries before it did in western Europe. Central banks were formed with branches in distant cities of the empire. The Muslims, as well as Greeks, Jews, Armenians, and other non-Muslims, used a variety of business and banking practices. Receipts, checks, and letters of credit were commonly employed in commercial transactions. A merchant who placed money in the care of a banker in Baghdad could therefore draw on that money from the banker's relative or employee when he arrived in Damascus or some other city far from his home bank.

Merchants and traders also developed joint-stock ventures and formed trade associations, early forms of modern capitalism. By using these devices, it became possible for several persons to pool their money and finance large trading expeditions. Since an expedition might take several years to send goods to markets in a distant country and return with the profits, no single member of the association would have been able to afford such a large, long-term expense alone.

tury ago that Western schools of medicine stopped including Islamic medical practices and textbooks as part of their requirements.

Well-equipped hospitals, usually associated with medical schools, were located in principal cities throughout the Islamic Empire. Much of the medical knowledge obtained from Greek works was transmitted by conquered Byzantine and Persian Christians. Some of the empire's finest doctors were Persians. Jews were also famed for their medical knowledge, and the brilliant Jewish philosopher and scientist, Moses Maimonides [mī mon'ē-dēs], was Saladin's personal physician.

At a time when superstition still hampered the practice of medicine in Europe, Muslim physicians throughout Spain, North Africa, and the Middle East developed cures based on careful observation of the patient, the symptoms, and the effects of treatment. Licensed physicians treated illnesses and performed delicate surgery. Pharmacies were common, and druggists had to pass an examination in order to practice.

Muhammad's directive that Muslims care for the poor and underprivileged inspired caliphs to provide medical services to rural areas. Caliphs also supported the licensing system that made medicine and health care so highly developed in the Muslim world. In the 8th century, Harun al-Rashid established a large hospital in Baghdad. The 12th-century Spanish traveler, Rabbi Benjamin of Tudela, described it in his journal:

Here there are about 60 physicians' stores which are provided from the Caliph's house with drugs and whatever else may be required. Every sick man who comes is maintained at the Caliph's expense and is medically treated. . . . Money is given to those who have stayed in the hospices on their return to their homes. . . . All this the Caliph does out of charity to those who come to the city of Baghdad, whether they be sick or insane. The Caliph is a righteous man; and all his actions are for good.

Probably the greatest of all Muslim physicians was the 9th-century Persian, **al-Razi**, known in the West as Rhazes [rā'zēz]. He was the author of many scientific works, including a comprehensive medical encyclopedia and a pioneering handbook on smallpox and measles. Other Muslim doctors

### 3 Science and the arts flourished.

Before the time of Muhammad, the Arabs had little knowledge of the physical and natural sciences. Their desire for trade and their extensive travel, however, promoted a need for more understanding of mathematics and astronomy. The Umayyad and Abbasid rulers who followed the early Arabs were tolerant of new ideas. Early Abbasid caliphs encouraged scholarship and paid for the systematic translation of books. Scholars eagerly studied the science and philosophy of the Greeks, and the works of Aristotle, Euclid, Ptolemy, Archimedes, and Galen were translated into Arabic. Later, the people of Europe would rediscover these Greek classics in Muslim Spain and, during the crusades, in Syria and Palestine. In addition to preserving Greek knowledge, Arab and Persian scientists also contributed many discoveries and theories of their own. In medicine, mathematics, astronomy, chemistry, and physics, Muslim achievements were particularly noteworthy.

#### **Muslim medical practices were the most advanced of the time.**

Islamic medicine is perhaps the best known of the Muslim achievements. In fact, it was only a cen-



advanced the treatment of eye diseases and developed an early method of vaccinating against smallpox. A 10th-century Persian physician, Avicenna [av'ə sen'ə], wrote the huge *Canon of Medicine*, which was the standard guide in Europe as well as Islamic medical circles until the late 17th century.

Muslim physicists founded the science of optics, the study of light. Al-Hazen [al hä'zen], a Persian who lived from 965 to 1039, challenged the Greek view that the eye sends rays to the object it sees. Al-Hazen said, correctly, that it was the other way around: one sees because the object sends rays of light to the eye.

Related to the field of medicine was the field of **alchemy** [al'kə mē], an Arabic word that means "the art of mixing metals." Alchemy was an ancient study that went back to early Egypt and early China. Alchemists worked with combining different metals to make stronger or more beautiful materials.

Muslim alchemists searched for a way to change less valuable metals such as lead into more precious ones such as gold. Although they were not successful, their experiments succeeded in perfecting ways of analyzing materials that became the basis of modern chemistry. For example, alchemists invented various methods of distillation and crystallization, which include melting, boiling, evaporating, and filtering. They also discovered new substances such as alum, borax, nitric and sulfuric acids, carbonate of soda, cream of tartar, antimony, and arsenic. The English words alcohol, borax, and alkali, for example, are derived from the Arabic *al-kuhl*, *buraq*, and *al-qili*.

### **Astronomy, mathematics, and literature advanced.**

Because Muslims needed to know exactly what time it was in order to say the daily prayers and to begin and end the fast of Ramadan they developed a concern for accurate timekeeping. Pilgrims, traders, and sailors also needed good ways of finding directions. Arab travelers like Ibn Batuta provided geographers and mapmakers with a wealth of information. Building on the work of Ptolemy and other Greek scientists, Arab astronomers made more accurate measurements of the length of the

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solar year, calculated eclipses, and made atlases of the night sky. Today, we still use Arabic names for some of the brighter stars, such as Altair ("the Eagle") and Algol ("the Demon").

Calculations for determining the positions of the planets, distances across land, and complex calendars, as well as the requirements for an advanced Muslim banking system, gave rise to the need for better mathematics. Arab mathematicians improved upon Gupta Indian numerals and the decimal system, combined it with their knowledge of arithmetic, and launched modern mathematics.

The Arabs were the first people to use the symbol  $x$  to represent the unknown in solving algebraic equations. Arab mathematicians developed algebra, from Arabic *al-jabr* meaning "putting together something incomplete," establishing it as a major field of mathematics. Important advances were also made by Arab scholars in analytical geometry and trigonometry.

Throughout history, scholars, philosophers, and poets have found it difficult to earn a living from their work. Today, such people often teach to earn money and can only do their own work in their spare time. This was also true in past times, but often rulers or wealthy nobles and merchants who enjoyed music, books, and works of art provided scholars and artists with enough support that they could concentrate on their work. Those who give such financial support are called patrons.

The Umayyad caliphs were generous patrons of the arts and scholarship. They supported literature and poetry, and they encouraged people to write down the early nomadic poetry that was only an oral tradition until then. In 830 an Abbasid caliph established a House of Wisdom in Baghdad for the translation of the Greek, Persian, Hebrew, and Indian classics. Here also was housed a research library, a museum, and an academy where scholars taught students.