Alphabets

2

Early visual language systems, including cuneiform, hieroglyphs, and written Chinese (see chapter 3), contained a built-in complexity. In each, pictographs had become rebus writing, ideographs, logograms, or even a syllabary. But these early writing systems remained unwieldy and required long, hard study to master. For centuries, the number of individuals who gained literacy was small. Their access to knowledge enabled them to acquire great power in the early cultures. The subsequent invention of the *alphabet* (a word derived from the first two letters of the Greek alphabet, *alpha* and *beta*) was a major step forward in human communications.

An alphabet is a set of visual symbols or characters used to represent the elementary sounds of a spoken language. They can be connected and combined to make visual configurations signifying sounds, syllables, and words uttered by the human mouth. The hundreds of signs and symbols required by cuneiform and hieroglyphs were replaced by twenty or thirty easily learned elementary signs. Figure 2–1 shows stages in the evolution of Western alphabets.

Numerous and often conflicting theories have been advanced about the origins of the alphabet; suggested sources include cuneiform, hieroglyphs, prehistoric geometric signs, and early Cretan pictographs.

Cretan pictographs

The Minoan civilization that existed on the Mediterranean island of Crete ranks behind only Egypt and Mesopotamia in its early level of advancement in the ancient Western world. Minoan or Cretan picture symbols (see Fig. 2–1) were in use as early as 2800 B.C. Short pictographic inscriptions written as early as 2000 B.C. have been found. About 135 pictographs survive; they include figures, arms, other parts of the body, animals, plants, and some geometric symbols. By 1700 B.C. these pictographs seem to have yielded to linear script writing, a possible precursor to the Greek alphabet.

One of the most interesting and perplexing relics of the Minoan civilization is the Phaistos Disk (Fig. 2–2), which was unearthed on Crete in 1908. Lacking precedent or parallel, this flat terra-cotta disk, 16.5 centimeters (6 inches) in diameter, has pictographic and seemingly alphabetic forms imprinted on both sides in spiral bands. Typelike stamps were used to impress each character carefully into the wet clay; thus the principle of movable type was used in a Western culture as early as 2000 B.C. Just what the inscriptions say, who made them, and whether the stamps or types were used to make messages on papyrus or other perishable substrates may never be known. Along with all Cretan pictographs, the Phaistos Disk remains a great mystery. Some scholars have suggested an origin other than Crete, but there is no evidence to support or reject this theory.

2–1. This diagram displays several evolutionary steps of Western alphabets. The controversial theory linking early Cretan pictographs to alphabets is based on similarities in their appearance.

2–2. The Phaistos Disk, undated. The 241 signs include a man in a plumed headdress, a hatchet, an eagle, a carpenter's square, an animal skin, and a vase.

Although the visual similarity between Cretan pictographs and early alphabet characters is striking, many paleographers question whether Cretan pictographs were the wellspring for the alphabet.

The North Semitic alphabet

~~While the alphabet's inventors are unknown, Northwest Semitic peoples of the western Mediterranean region—early Canaanites, Hebrews, and Phoenicians—are widely believed to be the source. The term *North Semitic writing* is used for early alphabetic writing found throughout this region. Because the earliest surviving examples are from ancient Phoenicia, a culture on the western shores of the Mediterranean Sea in what is now Lebanon and parts of Syria and Israel, these early scripts are often called the Phoenician alphabet. During the second millennium B.C. the Phoenicians became seafaring merchants. Their sailing ships, the fastest and best engineered in the ancient world, linked settlements throughout the Mediterranean region. Influences and ideas were absorbed from other areas, including Egypt and Mesopotamia.~~

Geography and commerce wield great influence upon the affairs of people. Even the development of the alphabet may have been an act of geography, for the Phoenician city-states became a hub in the ancient world and the crossroads of international trade. The Phoenicians absorbed cuneiform from Mesopotamia in the west and Egyptian hieroglyphics and scripts from the south. Possibly they had knowledge of Cretan pictographs and scripts and may have been influenced by them. Faced with this range of visible languages, they developed alternatives. Apparently the Phoenicians sought a writing system for their own Northern Semitic speech; evidence of a number of localized experiments has been unearthed.

~~*Sui generis*, a writing script developed in Byblos, the oldest Phoenician city-state, used pictographic signs devoid of any remaining pictorial meaning. Written about 2000 B.C.,~~ stone and bronze documents featuring this script have a syllabary of over a hundred characters and illustrate a major step toward the development of an alphabet.

Around 1500 B.C. Semitic workers in Egyptian turquoise mines in the Sinai desert area designed an achrophonic adaptation of hieroglyphics called *Sinaitic* script. *Achrophonic* means a pictorial symbol or hieroglyph was used to stand for the initial sound of the depicted object.

2–3. Ras Shamra script, c. 1500 B.C. Used for bureaucratic and commercial documents, myths and legends, the Ras Shamra script, reducing cuneiform to a mere thirty-two characters, has only recently been unearthed in the ruins of the ancient city of Ugarit.

2–4. The gestural curves of the Aramaic alphabet evolved into the Hebrew and Arabic alphabets.

2–5. The graphic forms of the Hebrew alphabet are squared, bold letters whose horizontal strokes are thicker than their vertical strokes.

2–6. Kufic characters are bold, elongated, and angular; their aesthetic properties are widely admired.

Ras Shamra script (Fig. 2–3), a true Semitic alphabetical script, was found on clay tablets inscribed around 1500 B.C.
It used thirty cuneiformlike characters to represent elementary consonant sounds. The signs were composed of wedge-shaped marks that resembled cuneiform because a similar stylus was used. There were no characters to signify vowels, which are connecting sounds that join consonants to make words, now represented by the letters *a, e, i, o,* and *u.* The alphabetical order of Ras Shamra script—the sequence in which the letters were memorized—was the same as those used in the later Phoenician and Greek alphabets.

The writing exported by the Phoenicians, a totally abstract and alphabetical system of twenty-two characters (see Fig. 2–1), was in use by 1500 B.C. One of the oldest datable inscriptions in the Phoenician alphabet was carved along the side of the lid of the limestone sarcophagus of the Byblos king Ahiram (c. eleventh century B.C.). The Phoenicians' right-to-left writing may have developed because stonemasons carved inscriptions by holding a chisel in the left hand and a hammer in the right. Their early alphabet script was also written on papyrus with a brush or pen; unfortunately, their literature, including, for instance, one Byblos author's nine-book work on mythology, has perished.

Although North Semitic writing is the historical beginning of the alphabet, it may have descended from an earlier, lost prototype. Early alphabets branched into multiple directions, including the Phoenician alphabet that evolved further in Greece and Rome, as well as the Aramaic alphabet, which gave rise to Hebrew and Arabic writing elsewhere in the region.

The Aramaic alphabet and its descendants

The Aramaic alphabet (Fig. 2–4), first used by tribes from Aram, a large area in what is now Syria, is a major early derivation from the North Semitic script. The oldest surviving specimen dates from about 850 B.C. The Aramaic alphabet of twenty-two letters for consonantal sounds was written from right to left. A wide pen held at a forty-five-degree angle often produced heavy horizontal and thin vertical strokes. This language and writing became dominant throughout the Near East. Examples have been found in Afghanistan, Egypt, Greece, and India. It is the predecessor of hundreds of scripts, including two major alphabets used today: modern Hebrew and Arabic. Both of these functional and beautifully designed letter systems are still written from right to left in the manner of their early Semitic predecessors.

The oldest known examples of the Early or Old Hebrew alphabet date from around 1000 B.C. When the Israelites returned to the western Mediterranean area following their Babylonian exile (586 to 516 B.C.), they discovered Aramaic writing had replaced Old Hebrew in the region. The Aramaic alphabet—possibly with influences from Old Hebrew—spawned the Square Hebrew alphabet, which evolved into modern Hebrew (Fig. 2–5). Basically, the Hebrew alphabet consists of the twenty-two consonantal letters of the ancient North Semitic alphabet. Four letters are also employed to indicate long vowels, and five letters have a second form for use at the end of a word. As the language evolved, dots and dashes were added to characters to indicate vowels.

The curving calligraphic gestures of Arabic writing probably originated before A.D. 500. The twenty-two original sounds of the Semitic alphabet are supplemented by six additional characters added to the end. Three letters are also used as long vowels, and diacritical marks are added for short vowels and to distinguish consonant sounds. The two principle forms are Kufic, from the famous Muslim academy at Kufah in Mesopotamia, and Naskhi, which became the dominant Arabic script after about A.D. 1000. Kufic (Fig. 2–6) is a bold inscriptional lettering with extended thick characters. Kufic has a majestic solidity and was widely used on coins, manuscripts, and inscriptions on metal and stone. It is still used for titles and decorative elements. The more cursive Naskhi style (Fig. 2–7) is ideal for writing on papyrus and evolved into the modern Arabic scripts. Its vertical ascenders followed by horizontal curved strokes below convey a kinetic rhythm as it moves across the page.

The design of Arabic letters changes with the position within a word. All but six letters connect to the following letter with a small, upward-curving stroke when used in the middle of a word. Letters at the beginning or middle of a word are abbreviated; final letters and letters standing alone terminate in a bold flourish. These design alterations do not change the fundamental structure of the characters.

After the Latin alphabet, Arabic is the most widely used alphabet today. Arab conquests during the seventh and eighth centuries A.D. spread the Muslim religion and its holy book, the Qur'an, written in the Arabic alphabet, from North Africa and Spain on the Atlantic to India. Muslims believe the Qur'an (also spelled *Koran*) contains great truths revealed by Allah (God) to the prophet Muhammad (c. A.D. 570–632) through the Archangel Gabriel. Respect for these religious writings has elevated calligraphy to a high art in Muslim cultures.

The Aramaic alphabet is believed to be the predecessor of scripts used in India, apparently arriving around the seventh century B.C. Extensive elaboration was necessary to develop alphabets suitable for Indian spoken languages. The Indian subcontinent has a complex array of spoken and written language forms, and the specific origins of early writing in India and its neighboring nations are quite controversial. Both classical Sanskrit (Fig. 2–8) and contemporary Indian writing have a vigorous horizontal and vertical structure, with the characters hanging from a strong horizontal stroke at the top. This horizontal stroke is believed to have originated from the scribal custom of writing beneath a ruled line, which gradually became part of the letter.

From North Semitic writing, the Aramaic alphabet and its descendants branched toward the East, forming a rich heritage of graphic forms remarkably different from their distant cousins, such as the Greek and Roman alphabets, that evolved in Western locales.

The Greek alphabet

Greek civilization laid the foundation for many of the accomplishments of the Western world—science, philosophy, and democratic government all developed in this ancient land. Art, architecture, and literature comprise a priceless part of the Greek heritage; it is fitting that the Greeks vastly improved the alphabet's beauty and utility after adopting it.

The Phoenician alphabet was adopted by the ancient Greeks and spread through their city-states around 1000 B.C. The oldest known inscriptions date from the eighth century B.C., but the Greek alphabet (Fig. 2–9, and see Fig. 2–1), occupying a major position in the evolution of graphic communication, may have developed earlier. The Greeks took the Phoenician or North Semitic alphabet and changed five consonants to vowels. It is not known for certain who transported the alphabet from Phoenicia to Greece, but both mythology and tradition, which, in the ancient world, frequently became scrambled with oral history, point toward Cadmus of Miletus (dates unknown). According to various ancient accounts, Cadmus invented history, created prose, or designed some of the letters of the Greek alphabet. These alleged accomplishments raise the possibility that Cadmus may have brought the alphabet to Greece.

In an enigmatic parallel, early Greek mythology reports that Cadmus, king of Phoenicia, set forth to find his sister Europa after she was abducted by Zeus. During his journey King Cadmus killed a dragon that had slain his traveling companions. On the advice of Athena, he planted the dragon's teeth like seeds, and an army of fierce men sprang forth from them. Tradition holds that King Cadmus brought the alphabet to Greece. Perhaps myth and oral history hint at a blinding truth: the power of Cadmus to raise armies from nowhere could be due to his command of the alphabet. Troop movements, scouting reports, and orders to the field could be delivered by writing. Cadmus's power to raise and direct armies came not from planting dragon's teeth but from using the alphabet as an information and communication tool.

Perhaps Cadmus's story is a myth and Phoenician traders brought the alphabet to Greece and other Mediterranean areas. Local Greek regions adapted the alphabet to their own needs until about 400 B.C., when Athens officially adopted a version that became standard throughout Greece.

The period around 700 B.C. saw a cultural renaissance in Greece. Achievements included Homer's *Odyssey* and *Iliad*, stone architecture, and human figures as major subjects on pottery. Large freestanding sculptures were only decades away. The city-state of Athens, cradle of representative government, organized surrounding towns into a unified political unit and moved toward an aristocratic republic by electing archons—the nine chief magistrates voted into one-year terms in 683 B.C. During this period the alphabet came into increasing use.

From a graphic design standpoint, the Greeks applied geometric structure and order to the uneven Phoenician characters, converting them into art forms of great harmony and beauty. The written form of Greek, as shown in *The Persians*, by Timotheus (Fig. 2–10), has a visual order and balance as the letters move along a baseline in an even repetition of form and space, The letters and their component strokes are somewhat standardized because a system of horizontal, vertical, curved, and diagonal strokes is used. In the inscriptional form, such as on the fifth-century B.C. votive stela with four figures (Fig. 2–11), the letters became symmetrical geometric constructions of timeless beauty. Stonecarvers took imaginative liberties with letterform design while maintaining the basic structure of the twenty-four-character alphabet that had stabilized by the classical period and is still used in Greece today. In this inscription, many letterforms, including the *E* and *M*, are based on a square, *A* is constructed from an equilateral triangle, and the design of the *O* is a near-perfect circle.

2–7. Musa Sa'id al Sa'idi al Najj, Quran manuscript, 1829–30. This manuscript is written in the cursive Naskhi style of Arabic calligraphy.

2–8. Indian Sanskrit type from a testament published in Calcutta, 1844. This type is based on a plain, scholarly hand known as Devanagari or town script.

2–9. Archaic Greek votive wheel, c. 525 B.C. A dedication to Apollo is clearly legible through the medium-green patina of this metal wheel, 16 centimeters (6 inches) in diameter, used for worship.

2–10. Timotheus, The Persians, papyrus manuscript, fourth century B.C. This excellent example of the Greek alphabet shows the symmetrical form and even visual rhythm that evolved. These qualities made the Greek alphabet the prototype for subsequent developments.

2–11. Votive stela with four figures, fifth century B.C. The design excellence of Greek inscriptions is clearly shown in this fragment. By using a three-sided square with a central dot for the E and a V-shaped horizontal in the A, the designer engaged in a personal inventiveness with form.

2–12. Greek wooden tablet with uncials, A.D. 326. The rounded uncials allowed an A to be made with two strokes instead of three, and an E to be made with three strokes instead of four.

2–13. Greek allotment tokens,
c. 450–430 B.C. In the Greek city-state, some public officials were elected and others were selected by lot. These tokens were used in the selection process.

2–14. Greek juror's ballots, fourth century B.C. A juror voted "not guilty" with a ballot having a solid hub. A hollow-hubbed ballot was used to cast a "guilty" vote.

2–15. Greek signature seals, fifth century B.C. The leaping dolphin was photographed from a plaster impression made from the seal. The heron standing on one leg, the ewe rising from the ground, and the racehorse with broken reins were reproduced from the actual carvings.

Initially the Greeks adopted the Phoenician style of writing from right to left. Later they developed a writing method called *boustrophedon,* from the words meaning "to plow a field with an ox," for every other line reads in the opposite direction. Line one reads from right to left; then the characters do an about-face, and line two reads from left to right. The reader thus scans the text with a continuous back-and-forth eye movement, unhindered by the need to return to the opposite edge of the column to read each line. Finally the Greeks adopted the left-to-right reading movement that continues to this day in Western civilization.

As early as the second century A.D. the Greeks developed a more rounded writing style called *uncials* (Fig. 2–12). This script could be written more quickly, because its rounded letters were formed with fewer strokes. In addition to use on manuscripts, uncials were written on wood and soft materials such as wax tablets and clay. Uncials also demonstrated how writing tools and substrates influence written forms. Greek scribes made their pens from hard reeds, cut into nibs and split at the tip to aid ink flow. These pens gave their writing a totally different character than writing by Egyptian scribes, who used soft reeds to brush ink onto the substrate.

~~The Golden Age of Athens (c. 500 B.C.~~) was the high point of Greek culture. Democracy, or "people rule," was practiced. Aristotle called democracy "a state where freemen and the poor, being in a majority, are invested with the power of the State." (Freedom and equality did not extend to all people. The system was, in fact, based on slavery, because slave labor freed citizens to devote their time and energy to public affairs.) The vote of the majority became law. Visual communications played a secondary role in the oral culture of the Greek city-state. All citizens could attend the popular assembly and vote, and all elected officials were responsible to it. The orator who could speak persuasively to the assembly, the actor, and the lecturer were paramount in these city-states, where the total population, including the surrounding countryside, seldom exceeded ten thousand people. The historian or poet who wrote rather than spoke was less seriously regarded.

Nonetheless, the alphabet played a role in democracy; it enabled the use of allotment tokens when selecting citizens by lot for public service (Fig. 2–13). Secret voting by jurors was possible through the use of metal ballots with alphabet inscriptions (Fig. 2–14). To authorize and endorse documents, wealthy Greek citizens used signature seals, which could be stamped into wax or clay (Fig. 2–15). Exquisite designs were engraved into the flat, oval bottom of a translucent, pale blue or gray variety of quartz. Animals were a favorite motif. The refined forms, harmonious balance, and wholeness of Greek sculpture were achieved in these small (about 2-centimeter, or 3/4-inch) signature seals used to impress a personal identification.

~~From the Macedonian city-state of Pella at the top of the Greek peninsula, Alexander the Great (356–323 B.C.) smashed the power of the Persian Empire and carried Hellenistic culture throughout the ancient world, including Egypt, Mesopotamia, and India. Reading and writing had become more important by this time, because the expansion of information and knowledge exceeded the ability of~~

~~an oral culture to contain and document it. Alexander formed libraries, including a major one with several hundred thousand scrolls, in the colonial outpost of Alexandria in Egypt.~~

~~The design format of the papyrus scroll was usually 10.5 meters (about 35 feet) long, 24 centimeters (9 or 10 inches) high, and, when rolled, 4 to 6 centimeters (about 1 to 2 inches) in diameter. The text layout was in flush-left/random-right columns about 8 centimeters (3 inches) wide, with generous 2.5-centimeter (about 1-inch) ditches between them.~~

Unfortunately, most of the knowledge compiled by Greek civilization has been lost due to the fragile nature of papyrus scrolls and the damp Greek climate. Only thirty thousand scrolls survive, including only forty-three of the 330 plays by the great Greek playwrights.

After Alexander's death in Babylon at the age of thirty-two, his generals divided his empire into separate Hellenistic kingdoms. Greek civilization and its alphabet now became influential throughout the world. The Greek alphabet fathered the Etruscan, Latin, and Cyrillic alphabets and, through these ancestors, became the grandfather of alphabet systems used throughout the world today.

The Latin alphabet

The rise of Rome from a small village to the great imperial city that ruled much of the world, and the eventual collapse of its empire, constitutes one of the great sagas of history. Perhaps as early as 750 B.C. Rome existed as a humble village on the Tiber River in central Italy. By the first century A.D. the Roman Empire stretched from the British Isles in the north to Egypt in the south, and from Spain in the west to the Persian Gulf at the base of the ancient land of Mesopotamia in the east.

From a farm near Rome, the poet Horace (65–8 B.C.) wrote, "Captive Greece took Rome captive." After the Roman conquest of Greece in the second century B.C., scholars and whole libraries were moved to Rome. The Romans captured Greek literature, art, and religion, altered them to conform to the conditions of Roman society, and spread them throughout the vast Roman Empire.

The Latin alphabet (see Fig. 2–1) came to the Romans from Greece by way of the ancient Etruscans (Fig. 2–16), a people whose civilization on the Italian peninsula reached its height during the sixth century B.C. After the letter *G* was designed by one Spurius Carvilius (c. 250 B.C.) to replace the Greek letter *Z* (zeta), which was of little value to the Romans, the Latin alphabet contained twenty-one letters: *A, B, C, D, E, F, G, H, I, K, L, M, N, 0, P, Q, R* (which evolved as a variation of *P*), *S, T, V,* and *X*. Following the Roman conquest of Greece during the first century B.C., the Greek letters *Y* and *Z* were added to the end of the Latin alphabet because the Romans were appropriating Greek words containing these sounds. Three additional letters were added to the alphabet during the Middle Ages to arrive at the twenty-six letters of the contemporary English alphabet. The *J* is an outgrowth of *I,* which was lengthened in fourteenth-century manuscripts to indicate use with consonant force, particularly as the first letter of some words. Both *U* and *W* are variants of *V,* which was used for two different sounds in medieval England. At the beginning of the tenth century, *U* was designed to represent the soft vowel sound in contrast to the harder consonant sound of *V*. The *W* began as a ligature, which is a joining of two letters. In twelfth-century England two *V* letterforms were joined into *VV* to represent "double *U*."

Rome took great pride in its imperial accomplishments and conquests, and created monumental letterforms for architectural inscriptions celebrating military leaders and their victories. Roman inscriptions were designed for great beauty and permanence. The simple geometric lines of the *capitalis monumentalis* (monumental capitals) were drawn in thick and thin strokes, with organically unified straight and curved lines (Figs. 2–17 and 2–18). Each letterform was designed to become one form rather than merely the sum of its parts. Careful attention was given to the shapes of spaces inside and between the letters. A Roman

inscription became a sequence of linear geometric forms adapted from the square, triangle, and circle. Combined into an inscription, these letterforms molded the negative shapes around and between them into a measured graphic melody of spatial forms, achieving an eternal wholeness.

Much debate has centered on the elegant Roman *serifs*, which are small lines extending from the ends of the major strokes of a letterform. One theory holds that the serifs were originally chisel marks made by the "cleanup" strokes as the stonemason finished carving a letter. Others argue that the inscriptions were first drawn on the stone with a flat signwriter's brush, and that the signwriter gave a short gesture before lifting the brush to sharpen the termination of the stroke. Regardless of which tool initiated the serif as a design element, we do know that the original letters were drawn on the stone with a brush and then carved into it. The shapes and forms defy mathematical analysis or geometrical construction. A letter found several times on an inscription will have subtle differences in width and proportion. In some inscriptions, lines with more letters will have both the letterforms and the negative spaces between them slightly condensed to accommodate the information. This represents an artistic judgment by the brushwriter rather than a measured calculation. Some Roman inscriptions even contain minute particles of red paint that have adhered to the stone through the centuries, leaving little doubt that the carved letters were painted with red pigment. Monumental capitals were carved as wedge-shaped troughs. The edges of the letterforms were not at sharp ninety-degree angles from the flat surface of the stone; rather, a more gentle, angled taper created a shallower edge that resisted chipping and wearing.

2–16. Etruscan Bucchero vase, seventh or sixth century B.C. A prototype of the educational toy, this rooster-shaped toy jug is inscribed with the Etruscan alphabet.

2–17. Carved inscription from the base of Trajan's column, c. A.D. 114. Located in Trajan's forum in Rome, this masterful example of capitalis monumentalis gives silent testimony to the ancient Roman dictum "the written word remains."

2–18. Detail, inscription on a tomb along the Appian Way, Rome. The controlled brush drawing of the forms on the stone combines with the precision of the stonemason's craft to create letterforms of majestic proportion and harmonious form.

The Roman written hand took several forms. The most important was the *capitalis quadrata* (square capitals), a style widely used from the second century A.D. until the fifth century. Written carefully and slowly with a flat pen, square capitals (Fig. 2–19) had stately proportions and clear legibility. The space between lines and letters was generous, but there was no space left between words. The letters were written between two horizontal baselines, and the *F* and *L* extended slightly above this line. The letter designs are quite similar to the letters we call *capitals* today. Serifs were added with the pen and strengthened the ends of the strokes.

The *capitalis rustica* (rustic capitals) were used during the same period (Fig. 2–20). These condensed letterforms were written quickly and saved space. Parchment and papyrus were expensive, and the style enabled the writer to include half again as many letters on the page as was possible with square capitals.

As is evident from the ruins of Pompeii and Herculaneum, Roman brushwriters wrote notices (Fig. 2–21), political campaign material, and advertising announcements on exterior walls, using both square and rustic capitals. Poster messages were also painted on reusable wooden panels placed in the streets. Placards and picture signboards were executed by professional letterers. Trademarks were widely used to identify the firm or place of origin of handcrafted products. Commercial records, documents of state, and literature were written on a variety of substrates. Papyrus from Egypt was supplemented by wood, clay, flat pieces

of metal, and wax tablets held in wooden frames. Writing was scratched into wax with a stylus, the flat end of which was used to erase the writing in the soft wax so that the tablet could be used again.

Around 190 B.C. *parchment* came into common use as a substrate for writing. Tradition holds that Ptolemy V (ruled c. 205–181 B.C.) of Alexandria and King Eumenes II (ruled 197–160 B.C.) of Pergamum were engaged in a fierce library-building rivalry; therefore, Ptolemy placed an embargo on papyrus shipments to prevent Eumenes from continuing his rapid production of scrolls. Parchment, a writing surface made from the skins of domestic animals—particularly calves, sheep, and goats—was invented to overcome the embargo. These refined leather sheets are made by first washing the skin and removing all hair or wool. Then the skin is stretched tightly on a frame and scraped to remove all traces of hair and flesh. After being whitened with chalk, it is smoothed with pumice. Larger, smoother, and more durable and flexible than papyrus sheets, parchment became very popular as a writing surface. *Vellum*, the finest parchment, is made from the smooth skins of newborn calves.

2–19. Capitalis quadrata (square capitals) from a manuscript, Vergil, c. A.D. 400.
The flat pen held at an angle produced thick and thin strokes and serifs.

2–20. Capitalis rustica (rustic capitals) from a manuscript, Vergil, c. A.D. 400. The flat-nibbed pen was held in an almost vertical position, creating a staccato rhythm of thin verticals contrasting with elliptical round and arched diagonal strokes.

2–21. Wall writing from Pompeii, first century A.D. Over sixteen hundred messages ranging from passages from Vergil to crude obscenities were preserved under more than 3.6 meters (12 feet) of volcanic ash.

The *codex*, a revolutionary design format, began to supplant the scroll (called a *rotulus*) in Rome and Greece, beginning about the time of Christ. Parchment was gathered in signatures of two, four, or eight sheets. These were folded, stitched, and combined into codices with pages like a modern book. The parchment codex had several advantages over the papyrus scroll. The clumsy process of unrolling and rolling scrolls to look up information yielded to the quick process of opening a codex to the desired page. Papyrus was too fragile to be folded into pages, and the vertical strips on the back of a papyrus scroll made writing on both sides impractical. Both sides of the parchment pages in a codex could be used for writing; this saved storage space and material costs.

During the rise of Christianity, from after A.D. 1 until around A.D. 400, scrolls and codices were used concurrently. The durability and permanence of the codex appealed to Christians because their writings were considered sacred. With a whole pantheon of gods and little clear distinction between god and man, pagan scholars were less inclined to revere their religious writings. Traditionally, pagan writings were on scrolls. Christians were also involved in the comparative study of different texts. It is easy to have several codices open on a table but virtually impossible to have several scrolls unrolled for comparative reference. Christians sought the codex format to distance themselves from the pagan scroll; pagans clung to their scrolls in resistance to Christianity. Graphic format thereby became a symbol of religious belief during the late decades of the Roman Empire. Christianity, adopted as Rome's state religion in A.D. 325 by the Emperor Constantine (d. A.D. 337), elevated books and writing to a position of far greater importance than their previous roles in the ancient world.

In the first century A.D. Rome began to experience hostile actions from tribal peoples (called Barbarians by the Greeks) living beyond the Danube and Rhine rivers. In A.D. 325, Emperor Constantine moved the

capital from Rome to the Greek town of Byzantium (later renamed Constantinople), located astride the mouth of the Black Sea. This weakened the western provinces, and the warlike Huns began to put great pressure on Rome's immediate neighbors. The Roman Empire was permanently divided in half in A.D. 395, and Rome itself was sacked by the Visigoths in A.D. 410. The emperor moved his court to Ravenna, which became the capital of the Western Roman Empire until it fell in A.D. 476, marking the final dissolution of the Roman Empire. Rome's legacy includes architecture, engineering, language, law, and literature. Its alphabet became the design form for visible languages in the Western world.

The Korean alphabet

The Korean monarch Sejong (A.D. 1397–1450) introduced Hangul, the Korean alphabet, by royal decree in 1446. Hangul is one of the most scientific writing systems ever invented. Although the spoken Korean and Chinese languages are totally different, Koreans were using the complex Chinese characters for their written language. Sejong developed a simple vernacular alphabet of fourteen consonant and ten vowel signs to put literacy within the grasp of ordinary Korean citizens. He assembled a team of gifted young scholars to undertake a systematic study of existing writing systems and develop an innovative visible language.

Fourteen consonants (Fig. 2–22) are represented by abstract depictions of the position of the mouth and tongue when they are spoken, and these are placed in five groups of related sounds. Ten vowels (Fig. 2–23) are signified by dots positioned next to horizontal or vertical lines. The vertical line symbolizes a person, the horizontal line signifies the earth, and the round dot is seen as a symbol of heaven.

The Hangul alphabet is not written in a linear sequence in the manner of Greek and Roman alphabets; rather, letters are combined within an imaginary rectangle to form syllabic blocks. These syllables are made by combining at least a consonant and a vowel (Fig. 2–24). Syllables containing a vertical vowel sign are composed and read horizontally from left to right, while those containing a horizontal vowel are composed and read vertically from top to bottom. Complex syllables are made by adding letters to the simple syllables or by combining elementary syllables into more complex configurations. Hangul's uniqueness among written languages stems in part from this system of clustering alphabet characters to construct syllables. In contemporary Korea the twenty-four letters are used to make over two thousand common syllables in everyday use.

Just as the invention of printing launched a quiet revolution in Chinese culture, alphabetic writing on papyrus slowly transformed Western society. Alphabetic writing was spread throughout the world by conquering armies, traders, and especially religious missionaries. Easy to write and learn, systems of simple signs for elementary sounds made literacy availableto large numbers of people. Alphabets are democratic writing; they put literacy within the reach of ordinary people, in contrast to the theocratic writing of the temple priests of Mesopotamia and Egypt. As scribes and priests lost their monopolies on written knowledge, their political power and influence declined. Secular and military leaders came to the fore as helmsmen in the classical world of Greece and Rome.

2–22. Hangul consonants signify the structure of the mouth when speaking Korean.

2–23. Ten Hangul vowels are signified by the placement of dots adjacent to vertical or horizontal lines.

2–24. This matrix shows how individual Hangui characters
are combined into blocks to correspond to spoken syllables in the Korean language.

Alphabets remain one of humankind’s grandest achievements. Alphabetic writing became the mortar binding whole communities against limitations imposed by memory, time, and place. Greater access to information permitted broader participation in public affairs.