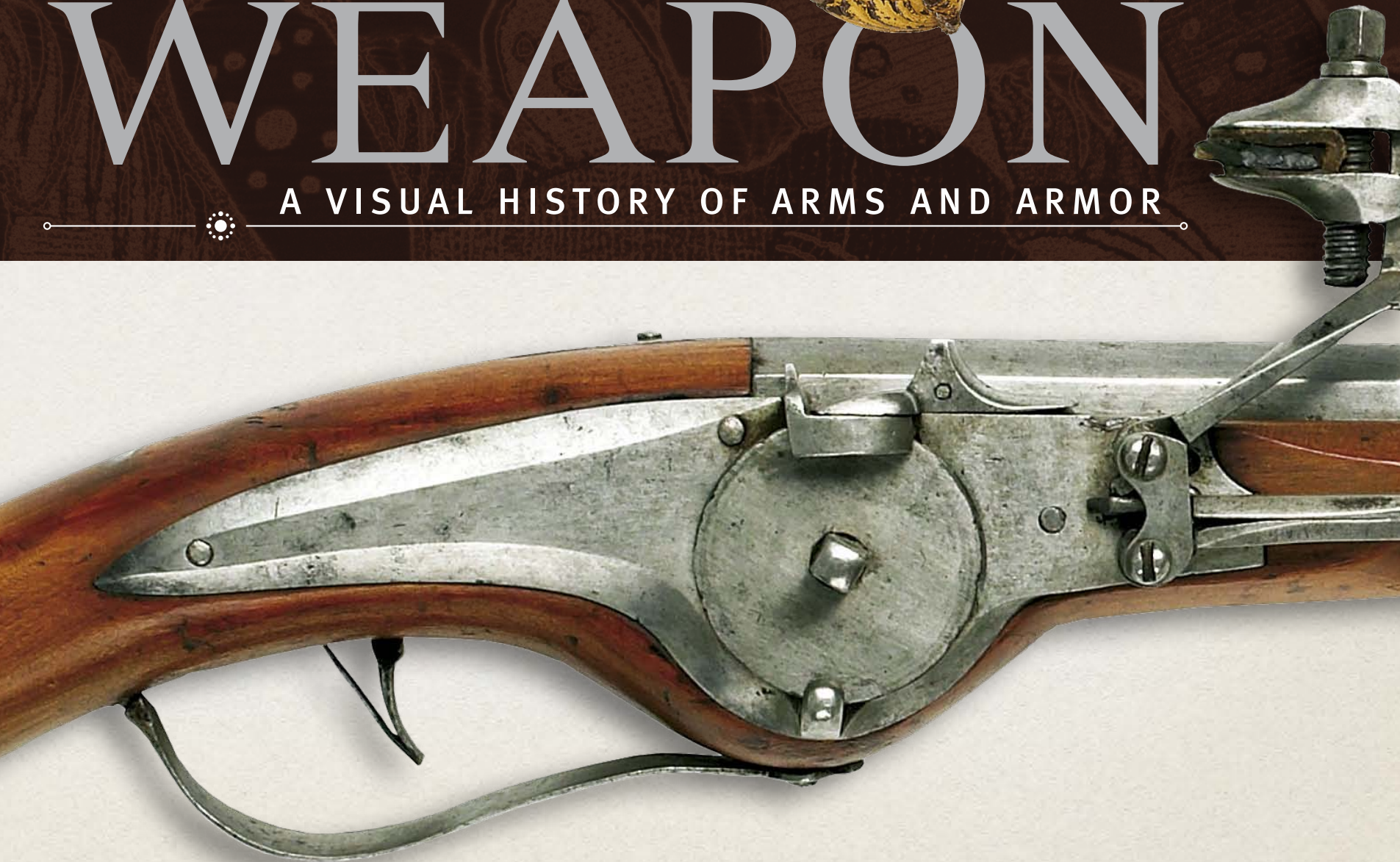




WEAPON

A VISUAL HISTORY OF ARMS AND ARMOR





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FOREWORD

Joining the Board of Trustees of the Royal Armouries in 2005 spun my life full circle. As a Cambridge undergraduate I spent a summer working at the Armouries, then located in the Tower of London. Had my career taken a different turn, I might easily have become a curator rather than a military historian. In one sense the two paths are not that divergent, for military history is never far from the battlefield: it is hard to think of men in battle without considering the weapons they use.

Warfare is older than civilization—in fact it is older than the human race itself, as clues from our hominid ancestors show—and weapons are the tools of the soldier's trade. The following pages reveal the importance of weapons, showing how they grew quickly from primitive implements used for hunting wild animals, and soon took on the characteristics that were to define them for thousands of years. First there were percussion weapons, used to strike an opponent directly, beginning with the club and proceeding through axes to swords, daggers and thrusting-spears. There were also missile weapons, propelled from a distance, starting with the sharpened stick—hurled as a javelin—and developing into throwing spears, arrows, and crossbow bolts. Gunpowder weapons, which made their presence felt from the 15th century, did not immediately replace percussion or missile weapons. In the 17th century musketeers were protected by pikemen, and Napoleonic cavalry plied swords in close-quarter combat. Even at the beginning of the 21st century the bayonet, descendent of the edged weapons of yesteryear, is still part of the infantry soldier's equipment.

The huge chronological and geographical spread of this book reveals illuminating similarities between weapons in entirely different cultures and periods. The appearance of firearms was not immediately decisive, and historians argue whether the period of change spanning the first half of the 17th century was rapid and thorough enough to





constitute a “military revolution.” However, their impact was certainly profound. Fortresses built to withstand siege-engines crumbled before artillery, and in this respect the fall of Constantinople in 1453 was a landmark. So too were battles like Pavia in 1525, when infantry armed with muskets repulsed armored horsemen. Firearms were essential to the advent of mass armies, for they became subject to mass production. Their development has been rapid: little more than a century and a half separates the muzzle-loading flintlock musket—short-ranged, inaccurate, and unreliable—from the modern assault rifle.

But weapons are more than the soldier’s tools, and leafing through the pages you will be amazed at the ingenuity and creativity that weaponry induces for hunting, self-defence, and law-enforcement. Some weapons had religious or magical connotations and others, like the pair of swords worn by the Japanese samurai or the smallsword at the hip of the 18th century European gentleman, were badges of status, and reflections of wealth too. There has been a long connection between the right to carry weapons and social position, and some societies, such as the city-states of ancient Greece, saw a direct connection between civic rights and bearing arms.

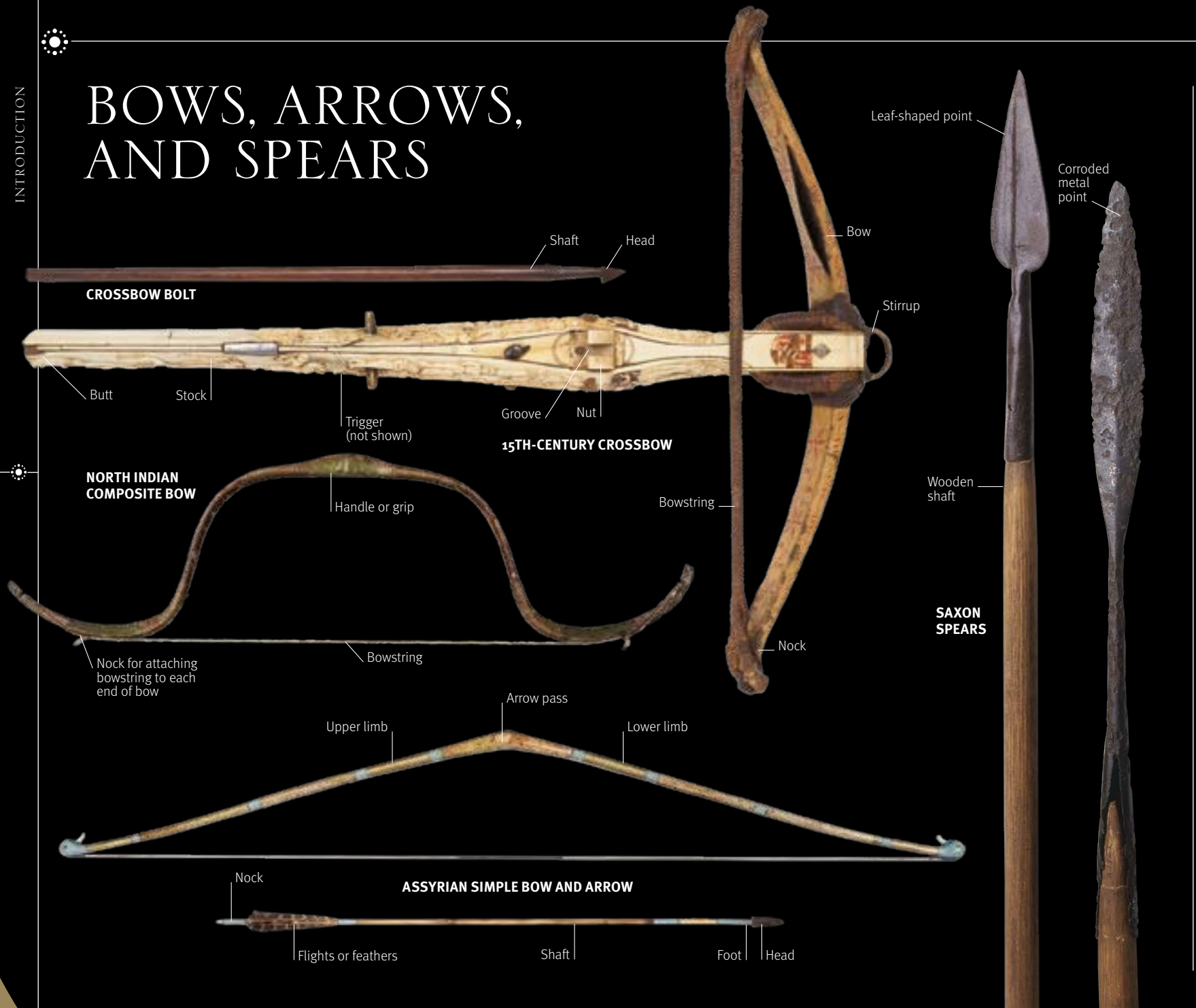
It is impossible to consider arms without reflecting on armor too, and this book also illustrates how armor has striven to do more than safeguard its wearers. It is often intended to impress or terrify as well as advertise its wearer’s wealth or status: the horned helmet of the bronze-age warrior and the mempo face-guard of the samurai have much in common. The past century has witnessed its rediscovery, and the contemporary soldier, with his Kevlar helmet and body armor, has a silhouette which is both ancient and modern.

It has been a real pleasure to have been involved in this project, which embodies the scholarship of the Royal Armouries’ curatorial staff and provides a showcase for the Armouries’ world-class collection.

RICHARD HOLMES



BOWS, ARROWS, AND SPEARS



PROJECTILE weapons, such as bows and spears, allow the exercise of force at a distance, and the evident utility of this in hunting led to their use from the very earliest times. The simplest form is the throwing spear, a pole with a pointed end. The principal disadvantage is that once thrown, the weapon is lost and might indeed be hurled back by an enemy. The Roman *pilum* solved this by having an iron shank that bent on contact, rendering further use impossible.

Simple bows are made up of a shaft of wood with a drawstring attached at both ends. In this form, they are easy to construct and operate, and saw use throughout the Ancient World. The composite bow, made of several pieces of wood glued together, its core strengthened with bone and sinew, has greater elasticity, and

therefore a greater range. In the hands of nomadic peoples such as the Mongols, it could devastate infantry formations that would be picked off at a distance. From the 13th century, the English made extensive use of the longbow, a simple bow up to 6½ ft (2 m) long made of yew. It combined range and rapidity of fire, and proved key to victory against the Scots at Falkirk (1298) and the French at Crécy (1346) and Agincourt (1415).

THE CROSSBOW

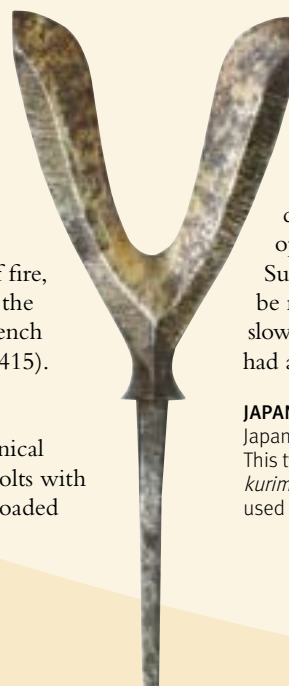
The crossbow is a form of mechanical bow shooting wooden or metal bolts with a stock that enables it to be kept loaded

without a string being held taut by hand. First attested in Han China (206 BCE–220 CE), they were widely used in medieval Europe from the crusades onward. As time went on, the mechanism to reload (or span) the crossbow became increasingly complex, including the use of foot-operated levers and the cranequin.

Such devices allowed the crossbow to be made more powerful, but meant it was slower to reload. By the late 16th century, it had almost disappeared from the battlefield.

JAPANESE ARROW

Japanese samurai used a variety of arrowheads. This type of bifurcated arrowhead, known as a *kurimata*, could inflict multiple wounds and was used for hunting as well as in battle.



AXES AND CLUBS



GLOSSARY

ARROW PASS Position on bow touched by arrow when bow is drawn or loosed
BACK Side of the bow toward the target
BELLY Side of the bow toward the archer
BRIDLE Binding used to tie bow portion of crossbow to stock
BUTT Back section of crossbow stock
COMPOUND BOW Bows made of multiple layers, combining wood with bone, horn, or sinew
CRANEQUIN Rack and pinion device for respawning
DAO Swordlike ax of the Assamese Naga
FLETCHING Use of feathers or flights to give stability
GOATSFOOT Device for respawning using pivots and a tiller
LAMINATED BOW Bow of multiple layers of the same material, most often wood
LATHI Long bamboo club with metal head used for riot control
LONGBOW Simple bow up to 6½ ft (2 m) long of yew or elm
MORNING STAR Club with spiked ball on a chain
NOCK Notch in arrow to keep it in place as bowstring is drawn; notch in bow to attach string
QUIVER Container for arrows
SHILLELAGH Irish club cut from blackthorn wood
SIMPLE BOW Bow made of a single material, often wood
SIMPLE CLUB Club made of one material, often bone or wood
STIRRUP Device in which crossbowman placed his foot while respawning the string
SPANNING The act of cocking a crossbow
STOCK Wooden spine of crossbow used for gripping and to which bow section attaches
TOMAHAWK North American ax, often combined with a tobacco pipe
WINDLASS Mechanical device with winding levers to respawn crossbow

ROCKS and sharpened stones would have been the most primitive form of weaponry. When these were mounted on a stick the result—a club or ax—immediately gave greater range and increased the force, through leverage, of the blow. Clubs could deliver crushing blows to armored opponents, while even a glancing strike from an ax could lead to massive bleeding.

Simple clubs appeared very early, but their effectiveness is proved by their appearance in such diverse forms as the Zulu's *knobkerrie* club, whalebone clubs from the Arctic regions of the Americas, and highly decorated wooden clubs from New Zealand. In the Pacific, such clubs were the most widespread weapon before European colonization. Composite clubs, with a head bound or socketed to a shaft, often added spikes or flanges, with a corresponding increase

in lethality. In Australia, throwing clubs, or boomerangs, were developed, some curved in such a way that their flight carried back to the thrower should they miss their target.

FORGING AHEAD

Hand axes were first used about 1.5 million years ago and were probably used as scrapers. Bronze-headed axes appeared in the Near East in the 3rd millennium BCE and became commonplace as far apart as Egypt and Scandinavia. The invention of iron and steel made the forging of sharper heads with thinner blades more practical. Although the Romans did not make extensive use of the ax, some of their

barbarian opponents employed them, such as the Frankish throwing ax (or *francisca*). The Vikings used a large two-handed battle ax as a principal weapon, and some forms persisted into the Middle Ages in modified form as halberds. In societies that retained a strong hunting tradition, however, axes remained in common use, from the North American tomahawk to the *dao*, a hybrid sword ax, of the Assamese Naga people.

ELITE CLUB

Although wooden clubs were used for fighting in South Africa, this beautifully produced example, with the ball at its end carved into 19 segments, is as likely to have been a prestige object belonging to a notable.



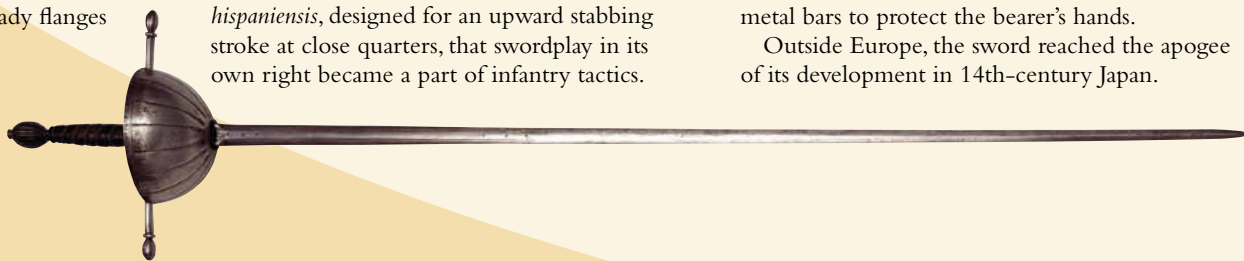
SWORDS AND DAGGERS



THE sword is one of the most widespread of weapons. In essence a long knife with a grip, its greater length and variations in the blade's shape and areas of sharpness mean it can be adapted for cutting or thrusting. The earliest blades were constructed of flint or obsidian, and it was not until the invention of bronze around the 3rd millennium BCE that swords really came into their own, with blades of increased strength and durability. Minoan and Mycenaean short swords (c.1400 BCE) lack sophisticated grips, but already flanges

CUP-HILT RAPIER

Hilts, such as the cup-shaped hilt on this rapier, became common in the 17th century. On other examples the quillons sweep down to deflect an opponent's stroke.



between the grip and hilt had been designed to protect the wearer's hand. By 900 BCE, with the invention of iron, and subsequently pattern-welding to blend the parts of the blade into a stronger and flexible whole, swords became more lethal.

SWORDS

The Greek hoplite's sword, however, was still a secondary weapon and it was not until the advent of the Roman legionaries' short *gladius hispaniensis*, designed for an upward stabbing stroke at close quarters, that swordplay in its own right became a part of infantry tactics.

By the Middle Ages in Europe, the carrying of a sword became the mark of a military elite. At first they tended to be broad-bladed for cutting and delivering crushing blows against mail armor. With the appearance of plate armor from the 14th century, swords tended to become narrower, more adapted to thrusting at vulnerable joints between the plates. They ultimately developed into the rapiers of the 16th and 17th centuries. Hilts became ever more elaborate, often with cups and baskets of metal bars to protect the bearer's hands.

Outside Europe, the sword reached the apogee of its development in 14th-century Japan.

CLAYMORE Scottish basket-hilted broadsword
FULLER Groove running along blade to lighten it
HAMON Pattern of hardened steel on Japanese sword
HILT Handle of sword or dagger, made up of guard, grip, and pommel

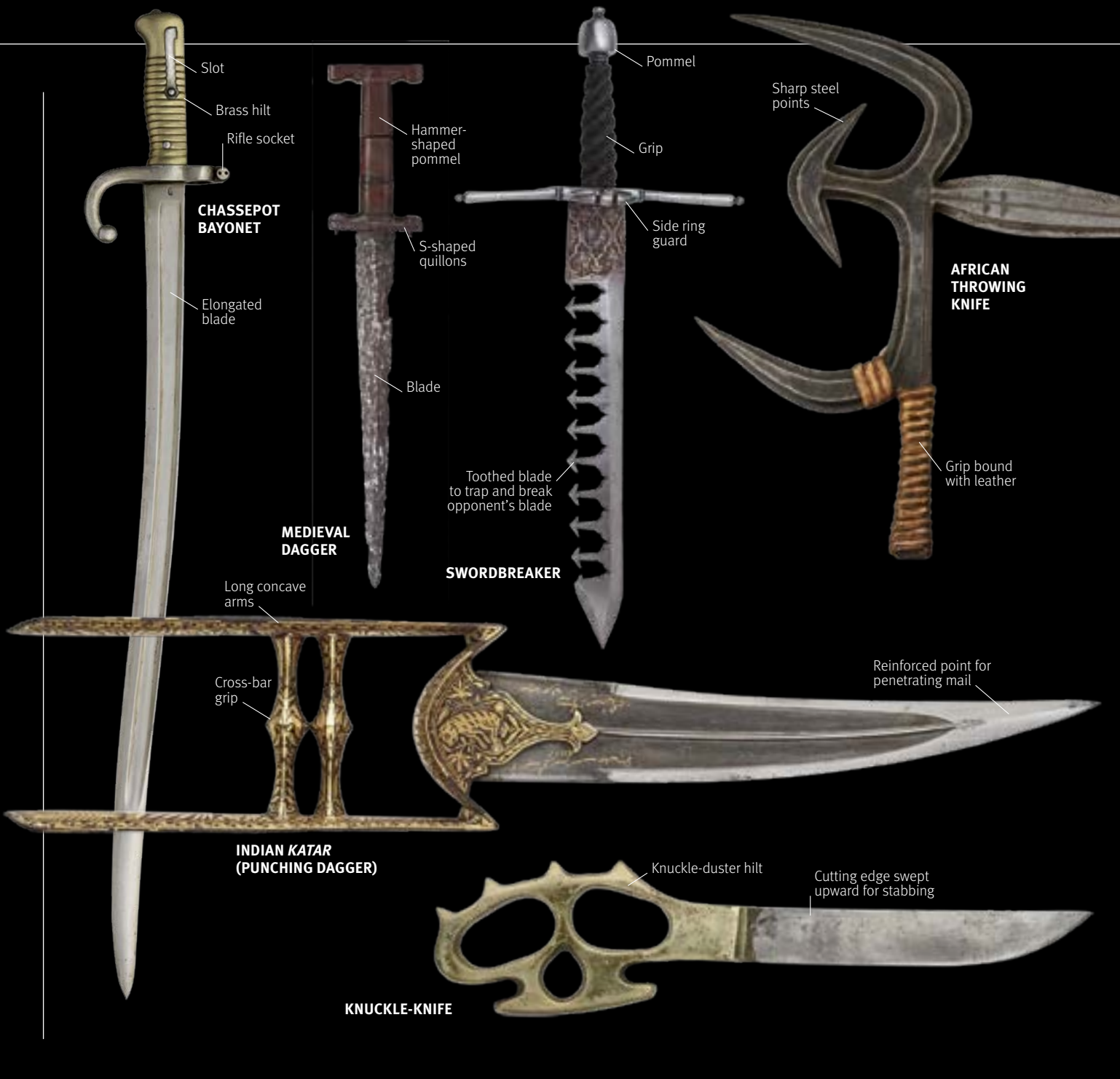
KILIC Thin Turkish blade with a curved grip
KISSAKI Point of Japanese sword blade
KRIS Malay dagger, often with wavy blade
KUKRI Short, curved sword from Nepal
MENUKI Hand-grip of Japanese sword
MUNE Back surface of Japanese sword
POMMEL Counterweight, often spherical, at top of sword grip to provide balance

QUILLON Guard cross-pieces lying at right-angles to the blade and hilt of a sword
RAPIER Thrusting sword with long blade, common from 16th century
RICASSO Unsharpened section of blade above sword guard

RONDEL Narrow-bladed medieval dagger
SABER Curved-bladed weapon, typically used by cavalry

SCHIAVONA Italian two-edged sword with basket-hilt used by Franks and Saxons
SHAMSHIR Persian saber
SHINOGO Ridge-line of Japanese sword

SMALLSWORD Light, one-handed sword that evolved from the rapier
SPATHA Longer, Roman cavalry sword
STILETTO Italian stabbing dagger with no cutting edge
TANG Hidden portion of the blade running through the hilt to the pommel
TANTO Japanese dagger
TSUBA Hand guard of Japanese sword



The *katana* long sword of the Japanese samurai was both a badge of rank and, with its layered folded steel blade, a lethally effective blade. The Islamic world, too, had a long history of swordmaking, with Damascus long acting as a center for sword manufacture and trade. The Ottoman Empire, with its emphasis on cavalry, produced many fine types, such as the curved *kilij* and *yataghan* sabers: from Mughal India came the *talwar*, with its characteristic disc-shape pommel.

CEREMONIAL SWORDS

The advent of hand-held firearms, however, rendered the sword—as many other close-quarters arms—almost redundant. In Western armies, the sword survived longest as a combat weapon in the cavalry, where a downward stroke at the gallop with a curved saber could inflict

severe wounds. But by the 20th century, the sword was largely a ceremonial weapon, confined to the dress uniforms of officers.

DAGGERS

Daggers were some of the earliest weapons, an evolution of a cutting knife for use in combat. Because of the relative shortness of their blades—from 6 to 19½ in (15 to 50 cm)—daggers are principally a close-quarters weapon, used for thrusting or stabbing.

In Africa, however, throwing knives evolved, with a variety of points designed to pierce at whatever angle they struck the target. Some daggers, such as the Indian *katar*, had reinforced blades and enhanced gripping surfaces to allow the penetration of mail armor. In the 17th century, as fencing techniques

became more elaborate, the dagger emerged, wielded in the other hand from the sword to allow parrying and close-in stabbing under the opponent's guard. Occasionally, daggers with toothed edges were used that could catch and break an enemy's weapon. From the 17th century, the dagger gave rise to the bayonet—essentially a dagger attached to a firearm should hand-to-hand combat occur.

The dagger continues to find use among warriors who are liable to find themselves in close contact with the enemy, such as those in the special forces.

MACHETE

A South American weapon with a characteristic curved blade that can be used both for cutting through undergrowth and hacking at enemies. This lightweight palm-wood example is from Ecuador.



STAFF WEAPONS



THE attaching of a blade or club to a long, commonly wooden, shaft to create a staff weapon gave foot soldiers some means to attack cavalry, or at least to keep them at bay. The greatest variety of types were seen in the later Middle Ages and Renaissance in Europe, just at the time social changes pitted infantry militias from Switzerland, the Netherlands, and Italy against armies of mounted knights.

Yet in origin, they are far more ancient than this. The principal weapon of the Greek hoplite in the 6th century BCE was a spear used in a phalanx formation as a thrusting weapon to create an almost impenetrable metal hedgehog. Alexander the Great's Macedonians in the

4th century BCE employed an extended—almost 20 ft (6 m) long—pike (or *sarissa*), but thereafter long-shafted staff weapons largely fell out of favor until the 13th century.

CRUSHING WEAPONS

Among those staff weapons used primarily for close-quarters fighting was the mace, which came to be a symbol of authority in some countries. The Egyptian ruler is seen wielding one on the Palette of Narmer (c.3000 BCE), while in late medieval Europe, the mace became associated with civic and royal power. Its military use was as a crushing weapon that could break bones even when they were shielded by armor.

Steel flanges were often used to focus the force of the blow and to inflict even more severe injuries upon opponents.

Many of the staff weapons that appeared from the 14th century onward had their origins in the modification of agricultural implements. The bill, for example, which had a sharp edge on the inside of the blade, is a modified scythe, while the military fork or trident is an adaptation of the farmer's pitch fork.

JOUSTING LANCE

Tournament lances such as this, with a tapering wooden shaft, were designed to shatter on impact with armor or a shield. If the point, or fragments of the wood, penetrated the neck or helmet, the injuries caused could be fatal.



GLOSSARY

BARDICHE Staff weapon with long, curved blade, commonly used in eastern Europe

BILL Staff weapon with wide, curved cutting blade

BOAR SPEAR Staff with long spearpoint, and lugs to prevent an injured boar working its way up the shaft

GLAIVE Staff weapon with long, single-edged knifelike blade

HALBERD Short, wide, ax-like blade, with a spearpoint, and a back spike for penetrating armor

LANGET Metal strips attached to shaft of staff weapon, protecting the joint with the weapon head

LOCHABER AX Wide, curved blade with a narrow curled hook for unseating cavalry

LUCERNE HAMMER Staff weapon with hammer head and pick point

MACE Metal ball attached to a staff, often spiked or flanged

MAGARI YARI

A Japanese form of trident

NAGINATA Japanese staff weapon with curved blade, similar to glaive

PARTISAN Wide-bladed weapon with a spearpoint and projecting winglike lugs at the base

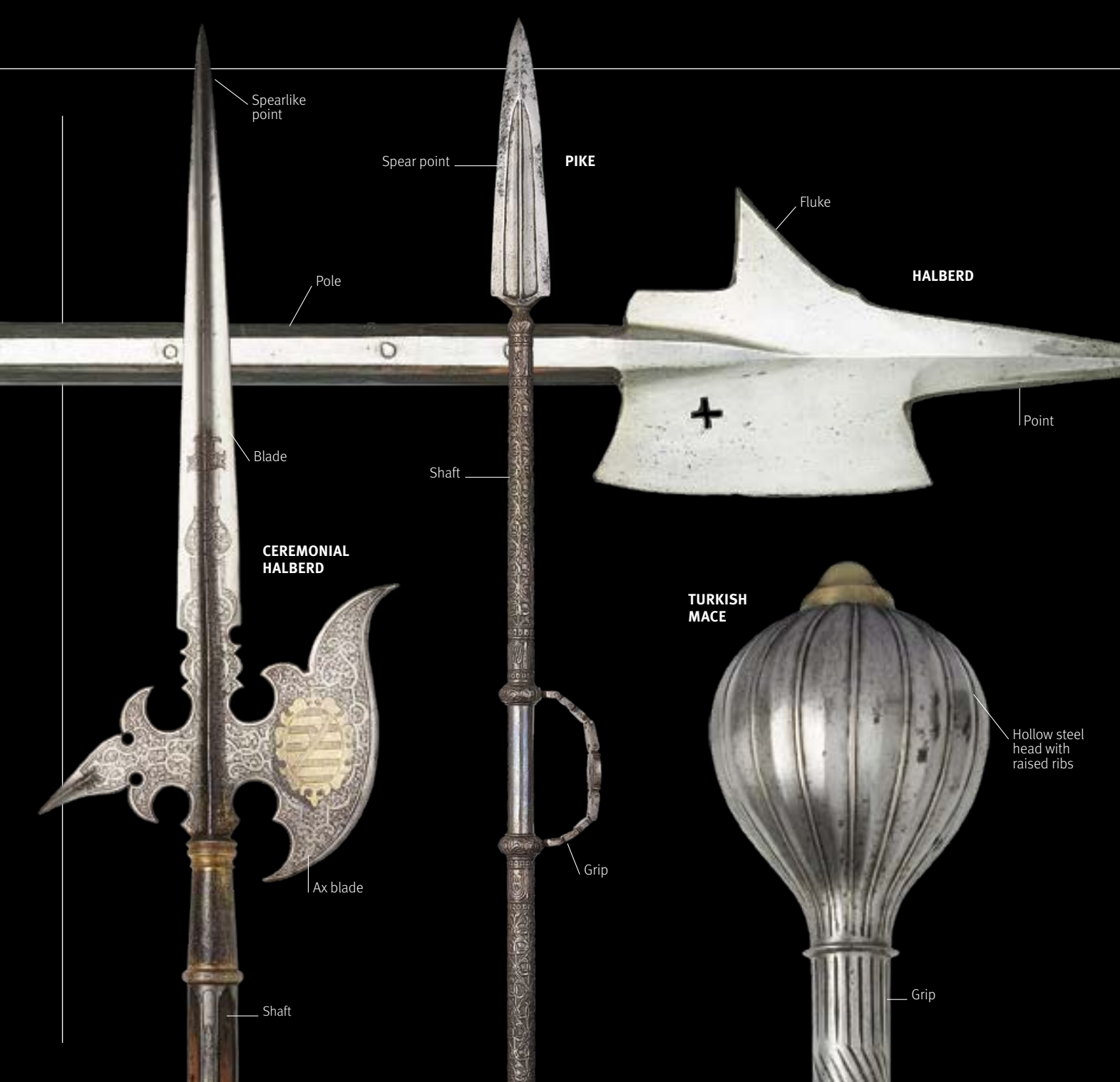
PIKE A long staff weapon, up to 23 ft (7 m) with spearpoint

POLEAX Staff weapon surmounted by an axhead. Often used by knights.

QUARTERSTAFF Simple staff without weapon head

SODE GARAMI Japanese “sleeve-tangler” used to unhorse enemies wearing loose-sleeved clothing

SPONTOON Short half-pike commonly carried by European non-commissioned officers in the 17th and 18th centuries



The pike, a simple variant of the ancient form, became the most widespread staff weapon, having earlier fallen out of favor. Wielded in dense formation by infantrymen, most notably the Swiss, and in mixed formations, such as the Spanish *tercio*, as a defensive shield behind which musketeers could fire, it would prove to be a useful multipurpose weapon. The pike showed its effectiveness in battles such as Courtrai (1302) where Flemish militiamen armed with long spears and wooden clubs (or *goedendags*) disrupted a charge by French knights and then hacked them to pieces.

LATER STAFF WEAPONS

The addition of an axhead to a pike point, along with a spike on the back of the head, created a halberd, a versatile weapon that—

shorter than a pike—could be used for thrusting, hooking cavalymen from horses, or clubbing. A common type of staff weapon in eastern Europe was the bardiche, which had a long cutting edge similar to an ax, but lacked the pointed end of the halberd.

Particularly in use among cavalymen was the war-hammer—with a hammer head on one side of the shaft—head and a picklike blade on the other. The hammer was used to stun opponents, the pick to penetrate armor to finish them off.

The increasing importance of firearms, however, meant fewer infantrymen were equipped with staff weapons. Increasingly they became badges of office for non-commissioned officers, lingering on into

the 18th and 19th century as the spontoon.

Yet just at this time, staff weapons in the form of the lance gained wider use in cavalry formations. Having their origins in the jousting weapons of medieval knights, lances were reintroduced in Napoleonic times as a shock weapon for units of Uhlans. As late as World War I, lances were still carried by the cavalry of some armies, but by then, both staff weapons and cavalry itself were relics of a past era.



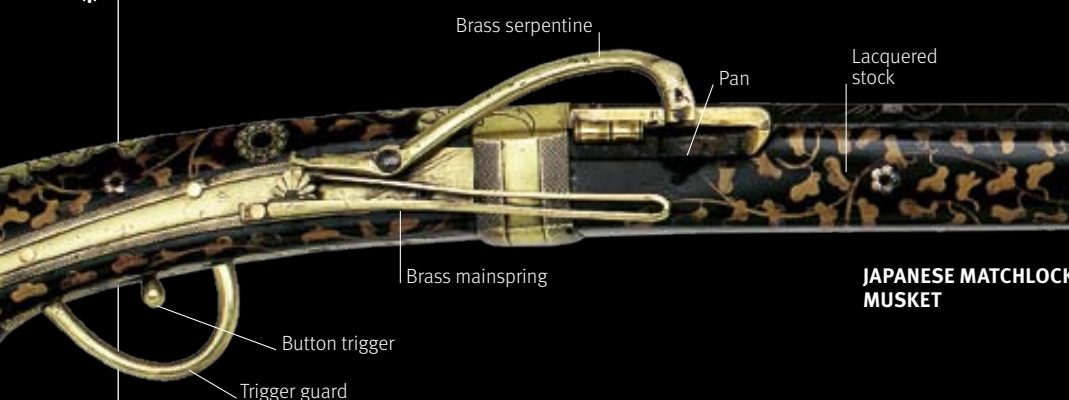
GERMAN PARTISAN

Almost the last type of staff weapon to survive was the partisan. Decorative versions, such as this late-17th century German example, were used as badges of office by sergeants and other non-commissioned officers.

FIREARMS



ENGLISH MATCHLOCK MUSKET



JAPANESE MATCHLOCK MUSKET

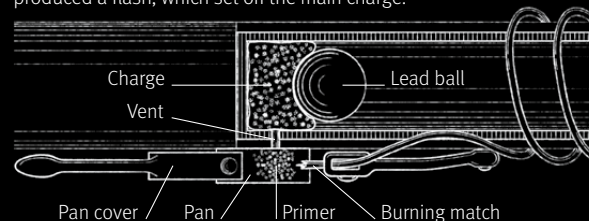


GERMAN WHEELLOCK MUSKET

Powder and Ball

HOW IT WORKS

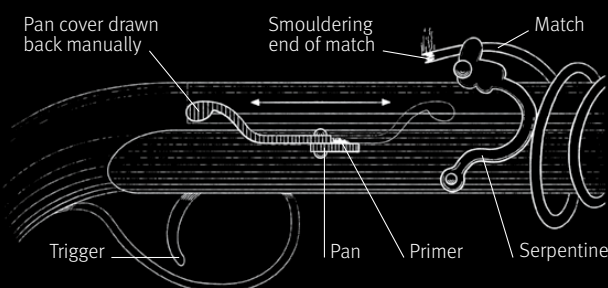
Gunpowder and ball were inserted separately into the barrel, which was drilled through to form a vent to a pan containing a small measure of powder. Ignited by a match (shown below) or sparks from a flint, it produced a flash, which set off the main charge.



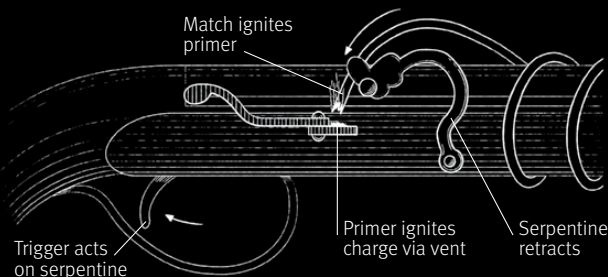
Matchlock

HOW IT WORKS

The first guns were set off by applying a coal to the pan by hand, but soon they acquired their first simple mechanical component—a bar that held a lighted slow-match in position above the pan. Later a pan cover and a spring-loaded trigger were added.



Before firing, the gun is made ready by blowing on the already-smouldering match to liven it, and by moving the pan cover aside.



Pulling the trigger plunges the match into the pan. This produces a flash that ignites the charge via a vent in the side of the barrel.

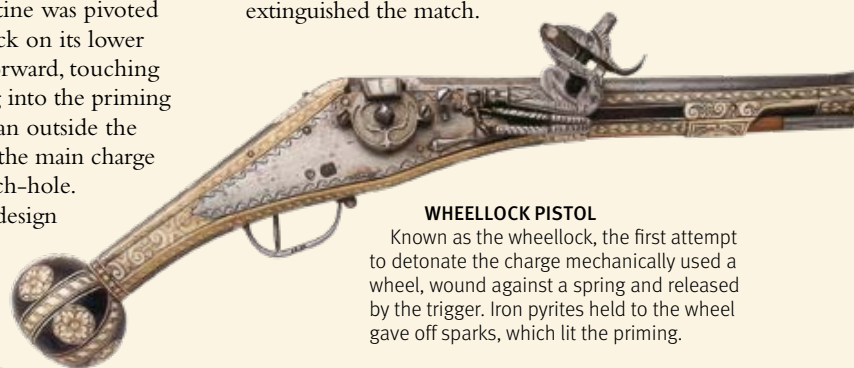
THERE is no certainty as to where gunpowder was invented; China, India, The Middle East, and Europe all have their supporters. As to when, most agree that it took place sometime during the 13th century, though it may have been earlier. We can be a little more precise about the invention of the gun, however. This took place prior to 1326, for two separate contemporary manuscripts tell us so, and from that date onward, references to guns become more frequent. The earliest known example of a gun was found in the ruins of the castle of Monte Varino, in Italy, which was destroyed in 1341. The gun was a simple tube, closed at one end and drilled through near that end to allow the charge of powder inside to be ignited with a glowing wire or coal. It was fitted with a pole at the breech, and probably required two men to fire it.

MATCHLOCKS

The first improvement to this simple design, which created the matchlock, saw the addition of a serpentine (so-called because it was S-shaped and resembled a snake) which held a length of string (or "slow-match"), treated with saltpeter to keep it alight. The serpentine was pivoted around its center; pulling back on its lower arm pushed its upper arm forward, touching the glowing end of the string into the priming powder. The latter lay in a pan outside the barrel, but was connected to the main charge of powder and ball by a touch-hole.

The chief advantage of this design was that one man could use it on his own. A trigger was added later, to act upon the serpentine

by way of a connecting sear, along with a spring that held the match off the pan until positive pressure was applied to the trigger. A version was also produced in which the spring worked the other way (when the sear was released, it propelled the match forward)—but the impact often extinguished the match.



WHEELLOCK PISTOL

Known as the wheellock, the first attempt to detonate the charge mechanically used a wheel, wound against a spring and released by the trigger. Iron pyrites held to the wheel gave off sparks, which lit the priming.

ACTION The method of loading and/or firing a gun.

AUTOMATIC A firearm that will continue to load and fire while the *trigger* is pressed.

BATTERY The state of a gun's *action* when it is ready to fire.

BENT A notch on the *cock*, hammer or striker in which the *sear* engages, to hold it off.

BELT FEED A way of supplying ammunition to the *breech* of an *automatic* weapon.

BLOWBACK A way of operating an *automatic* or *semi-automatic* weapon in which the *breech* is not locked, but held closed by a spring or by inertia.

BOLT The part of the weapon that closes and seals the *breech*. It may also load and extract cartridges and carry the firing pin.

BOLT ACTION A firearm relying on a turning *bolt* to lock its *breech* closed.

BORE The number of shot of a given size which can be cast from 1 lb of lead; the diameter of a barrel.

BOX-LOCK A flintlock in which the *action* is contained within a central box behind the *breech*.

BREECH The closed rear end of a gun's barrel.

BREECH-BLOCK Analogous to the *bolt*.

BULLET The projectile a weapon fires. It may be spherical, cylindro-conical (a cylinder with a cone-shaped point) or cylindro-ogival (a cylinder with a rounded point), or even hollow-pointed.

BULLPUP A rifle that has its mechanism set well back in the shoulder stock, allowing a normal barrel length in an abbreviated weapon.

BUTT The stock between shoulder and *trigger*; the part of a pistol held in the hand.

CALIBER The internal diameter of the barrel.

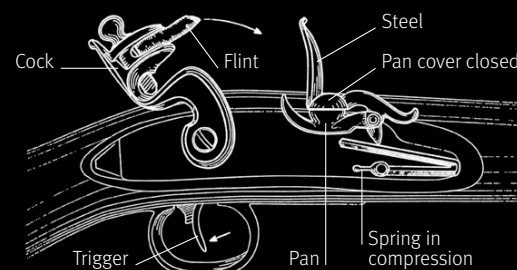
CARBINE A short-barreled rifle or musket.

CARTRIDGE CASE The container for the propellant, *primer* and projectile. ▶

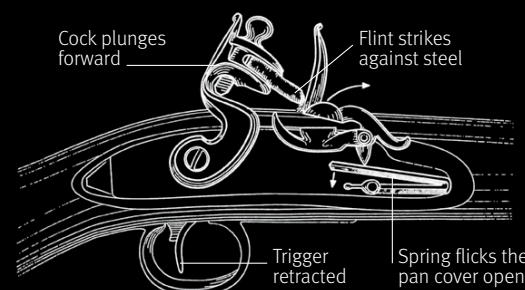
Flintlock

HOW IT WORKS

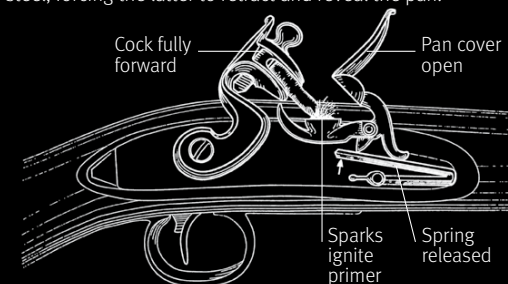
Because matches were unreliable, they were replaced by a device that produced sparks—a flint, propelled by a spring to strike a serrated steel. A link between trigger and pan cover was added, plus a spring to move the pan as the flint fell.



Before firing, the cock is retained by a mainspring (not shown here), which is connected to the trigger by a sear. A second spring holds the pan cover closed over the pan.



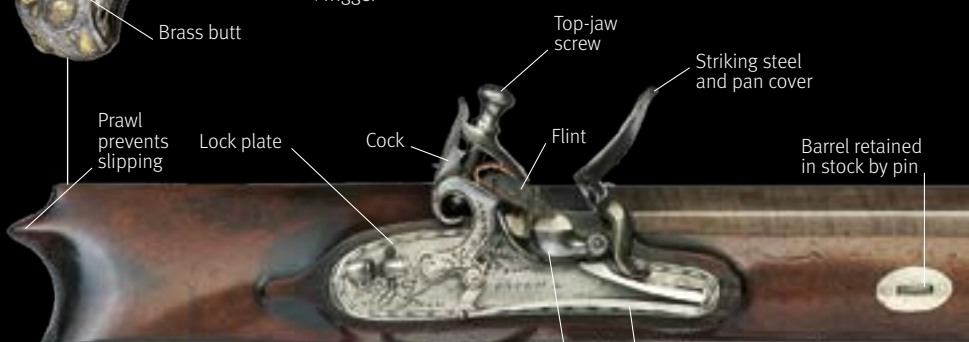
Pulling the trigger propels the cock forward to hit the edge of the steel. This releases a second spring, which acts on the steel, forcing the latter to retract and reveal the pan.



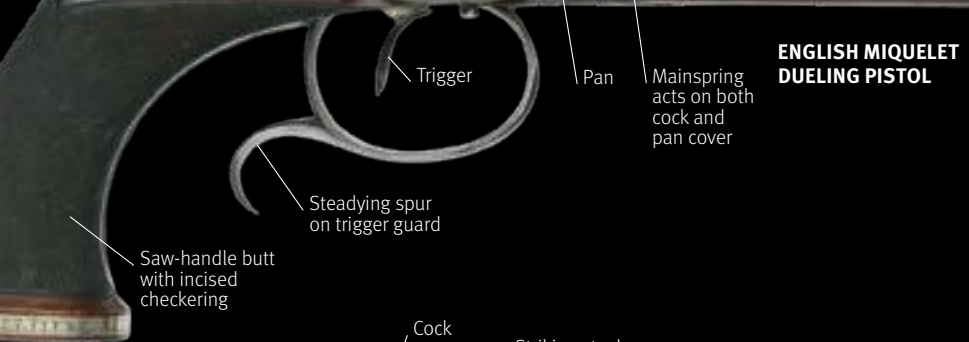
Sparks caused by the flint striking the steel fall into the pan to ignite the primer. This produces a flash that ignites the charge via a vent in the side of the barrel.



FLINTLOCK PISTOL



ENGLISH MIQUELET DUELING PISTOL



FLINTLOCK BLUNDERBUSS PISTOL

Despite various improvements, however, the matchlock remained a cumbersome and unpredictable device. Far more reliable was the wheellock, invented around 1500, which used a wheel turned by a coiled spring to strike sparks from pyrites into the pan. Though complicated, it made it possible for the gun to be used one-handed and for it to be held ready for use.

FLINTLOCKS

The next step was to find a simpler way of creating sparks. This was achieved by using a spring-loaded flint (which lasted longer than pyrites) and bringing it into contact with a suitably-shaped serrated steel,

striking sparks from it in the process. The first such lock was known in English as a snaphance, or snaphaunce, a corruption of a Dutch phrase, *schnapp hahn*, “pecking hen,” which described the action of what became known as the cock.

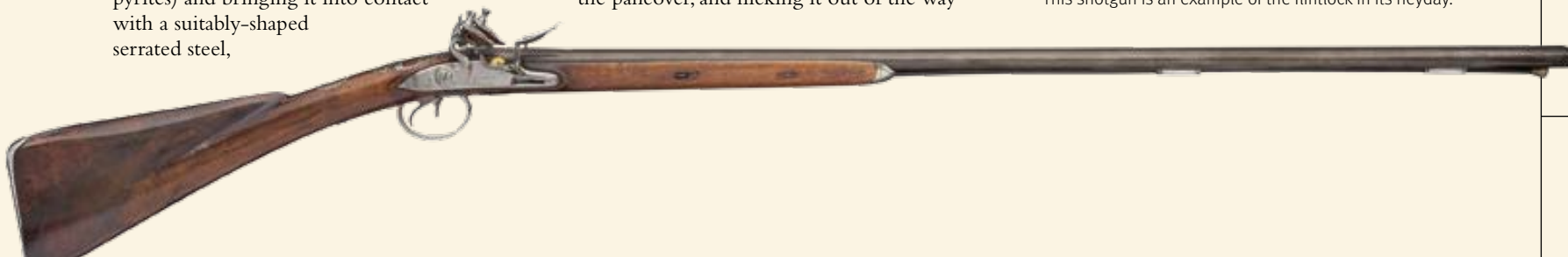
The snaphance originated in northern Europe, but at around the same time, a very similar device was coming into use in Italy. It had shortcomings, notably the way the pan cover was displaced by an awkward linkage to the trigger, but these were overcome in Spain about halfway through the 16th century by the simple expedient of extending the foot of the steel to become the pancover, and flicking it out of the way

at the vital moment by means of the exposed mainspring, creating the miquelet lock.

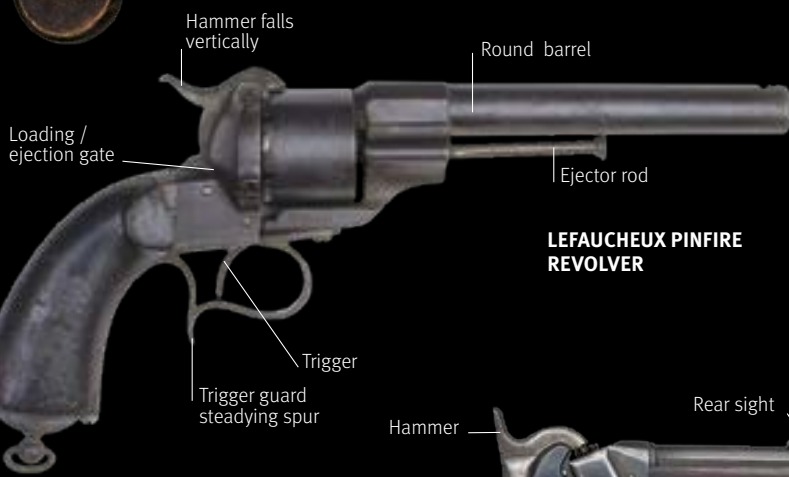
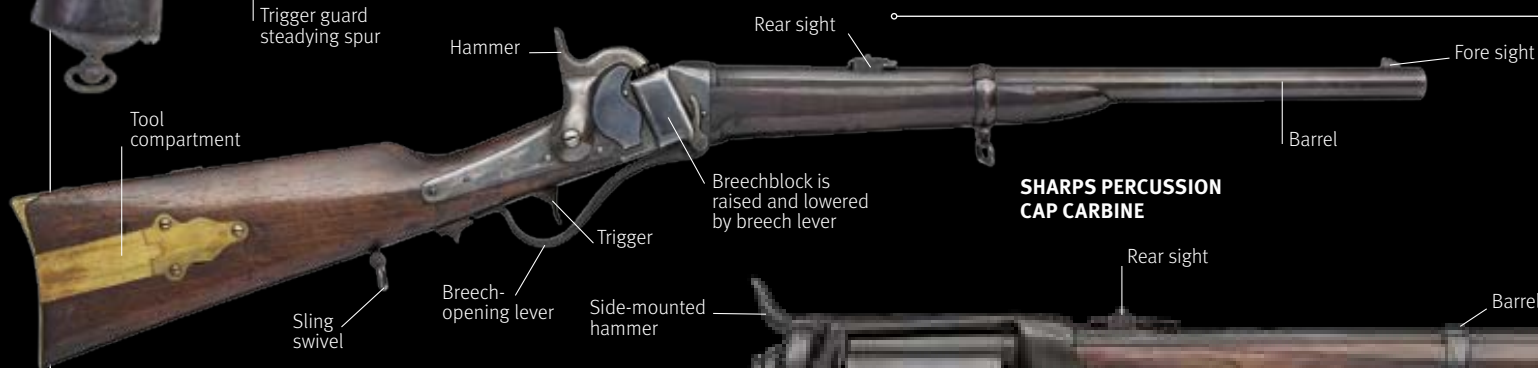
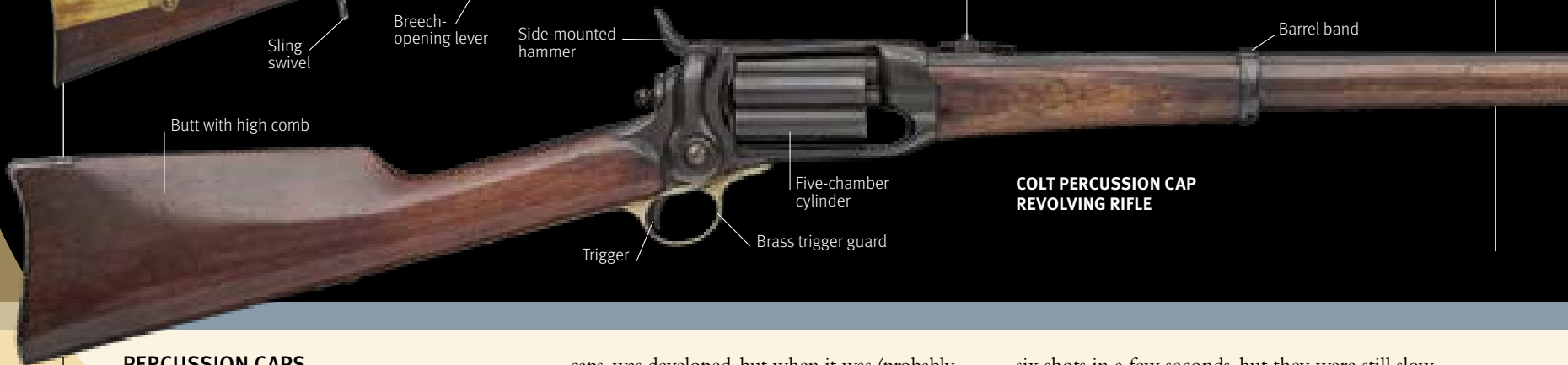
About 60 years later, a French gunmaker, Marin le Bourgeois, combined the one-piece steel and pan cover of the miquelet lock with the internal mainspring of the snaphance to produce the first true flintlock. Later improvements were minor, and saw the addition of roller bearings and strengthening bridles.

HADLEY FLINTLOCK SPORT GUN, 1770

The flintlock was perfected by about 1750, having acquired roller bearings to act on the springs and bridles to hold the components in perfect alignment. This shotgun is an example of the flintlock in its heyday.



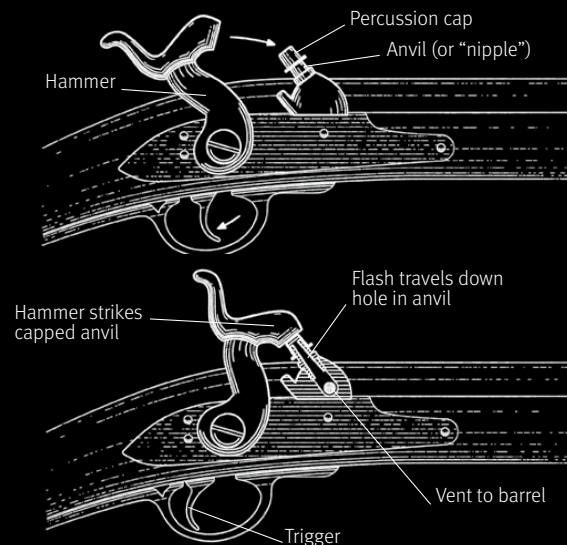
FIREARMS

**UNDERHAMMER PERCUSSION CAP PISTOL****LEFAUCHEUX PINFIRE REVOLVER****SHARPS PERCUSSION CAP CARBINE****COLT PERCUSSION CAP REVOLVING RIFLE**

Percussion Cap

HOW IT WORKS

The cap is formed of two layers of copper foil between which a mixture of fulminate of mercury, potassium chlorate, and sulfur or antimony. The composition bursts into flame when it is struck, the flame burning through the foil and passing down the bore of the anvil to ignite the powder.



The hammer acts on a mainspring and is retained, holding it under pressure, by a sear connected to the trigger. Tripping the sear releases the hammer, driving it onto an anvil on which the percussion cap has been placed.

The primer in the cap bursts into flame when it is struck. The flame passes down a bore in the anvil and into the powder charge in the barrel.

PERCUSSION CAPS

Even in its most efficient form, the flintlock had its drawbacks. Chief among these were the need for the flint to be kept in precisely the right shape and place, and for the touch-hole to be kept clear of residue. There was also a delay between the cock falling and the gun firing. Fulminating salts, which exploded on impact, had been known for over a century, but they were still too volatile to be a practical substitute for flint. Then, in 1800, Edward Howard synthesized fulminate of mercury, which was relatively docile. The Reverend Alexander Forsyth (a keen wildfowler) combined it with potassium chlorate and used the new priming to detonate gunpowder. It was another 20 years before a reliable system of delivering fulminate primer to the breech, in the shape of percussion

caps, was developed, but when it was (probably by British-born artist Joshua Shaw, working in the US in 1822), it rendered all other ignition systems obsolete.

REVOLVERS

The first firearms produced to exploit the new development were conversions of existing weapons (single-shot muzzle-loading pistols and rifles), but they were soon joined by multiple-barreled pistols, known as pepperboxes, in which a group of barrels was mounted on an axial rod which was turned, complete with charge and percussion cap, to present a fresh barrel to the hammer. And then, in 1836, a young American named Samuel Colt patented the cylinder revolver, and began producing both pistols and rifles in this form. Colt's guns could fire

six shots in a few seconds, but they were still slow to load, even though the loading process had become easier with the invention of the waterproof cartridge, which contained both charge and projectile and didn't have to be introduced via the muzzle.

**PEPPERBOX REVOLVER, 1849**

The pepperbox revolver, with its barrels mounted on an axial pin, was a successful, though expensive, way of producing a multiple-shot pocket pistol. It was soon superseded by the cylinder revolver.



CHARGER A frame that holds cartridges, allowing them to be loaded into a *magazine*.
CLIP See *charger*.
CLOSED BOLT A configuration found in *automatic* and *semi-automatic* weapons in which *battery* is with the *bolt* in the closed position, with a cartridge chambered; see also *open bolt*.
COCK The clamp that holds the flint in a flintlock weapon; the act of pulling back a hammer, *bolt* or *cock* to ready a weapon for firing.
COMPENSATOR A device that reduces the *muzzle's* tendency to lift or swing.
CYCLE The series of operations necessary to fire a round and return the gun to *battery*.
CYCLIC RATE The notional rate of fire of an *automatic* weapon.
DELAYED BLOWBACK A type of *blowback action* in which the *bolt* is briefly delayed to allow chamber pressure to drop to a safe level.
DOUBLE-ACTION A pistol in which the act of pulling the *trigger* first *cocks*, then releases, the *action*.
EJECTOR A device that throws a spent *cartridge case* clear after it has been extracted from the chamber.
EXTRACTOR A device that grips the *cartridge case* and pulls it clear of the chamber.
FLASH ELIMINATOR An attachment at the *muzzle* that cools the propellant gas below its flash point.
GAS OPERATION A weapon in which the cycle is effected by the propellant gas.
GENERAL-PURPOSE MACHINE GUN (GPMG) A *machine gun* that can be used as a *light machine gun* or in the sustained-fire role.
GRIP SAFETY A device that keeps the weapon from being fired unless held correctly.
GROOVES The parallel spirals cut into the barrel that give spin to the *bullet*.
GUNPOWDER A mixture of saltpeter, charcoal, and sulfur.
HEAD The closed end of a *cartridge case*, where the *primer* is located. ▶

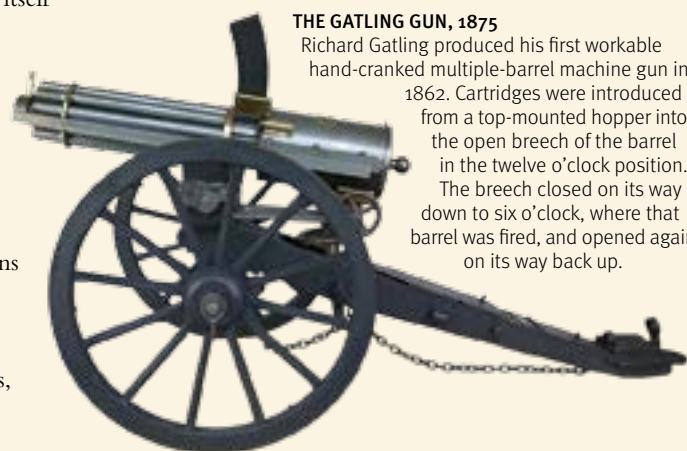
Colt enjoyed a monopoly until 1857, but by the 1850s gunmakers on both sides of the Atlantic had begun to consider afresh the thorny problem of how to load a gun at the breech and then to make a gas-tight seal there—a process called obturation.

BRASS CARTRIDGES

Already, by about 1840, Parisian gunmaker Louis Flobert had produced the first brass cartridges—tiny affairs (used for indoor target practice) in which the propellant was fulminate. Flobert showed his cartridges at the Great Exhibition in London in 1851, and thus to every gunmaker of note in the world. One of these, Daniel Wesson, took the idea further, and combined fulminate primer, contained in the rim of a brass case, with gunpowder and a bullet;

the unitary brass cartridge was born. This new type of cartridge solved two problems at once. It combined all the elements of a gun's ammunition into one package, and it guaranteed perfect obturation, since the brass casing itself formed the seal at the breech. Rim-fire cartridges were imperfect and soon disappeared in all but the smallest calibers, but more robust center-fire cartridges were available by 1866, and soon the world's armies were clamoring for them. Just as the first percussion weapons had been converted flintlocks, so the first martial breech-loaders were converted muzzle-loaders, but these were stop-gap measures,

and it was only a few years before the first purpose-designed breech-loaders, such as the Martini-Henry and the Mauser M71, were being issued.



THE GATLING GUN, 1875

Richard Gatling produced his first workable hand-cranked multiple-barrel machine gun in 1862. Cartridges were introduced from a top-mounted hopper into the open breech of the barrel in the twelve o'clock position. The breech closed on its way down to six o'clock, where that barrel was fired, and opened again on its way back up.

FIREARMS



REPEATER FIREARMS

At the other end of the scale, Wesson and his partner Horace Smith, who had worked for Winchester, had turned their attention to designing a revolver to take brass cartridges, but had discovered that a patent already existed for the “bored-through” cylinder that they needed to utilize. Fortunately, they were able to acquire it, in return for a royalty of 15 cents for every gun they produced, and in 1857, as soon as they were free to exploit Colt’s patent, they unveiled the first effective cartridge revolver. Colt was then frustrated by patent protection in his turn, and it was only in 1873, 11 years after his death, that his company was able to bring out another world-beater: the Single-Action Army revolver, widely known as the Peacemaker. Elsewhere, others were attempting to exploit the

self-contained nature of the brass cartridge to produce other types of repeating firearm. Two were notably successful early on: Christopher Spencer and Benjamin Tyler Henry, both of whom produced tubular magazine repeater rifles in 1860 (Spencer’s had its magazine in the butt; Henry’s was below the barrel). Both were imperfect, however, for they could only handle low-powered ammunition, and this did not satisfy military requirements. The US Army, therefore, clung to its single-shot breech-loaders, but in Europe, thanks largely to the Mauser brothers’ success with the M/71, attention swung to designing

rifles with rotating bolts. Spencer’s and Henry’s guns had another weakness, too: their tubular magazines. The problem lay in the fact that the tip of the bullet was lodged against the primer of the cartridge ahead of it, and in certain circumstances could work as a firing pin, with catastrophic results.



SPRINGFIELD M1903

The US Army kept single-shot breech-loaders until 1892, when it adopted a bolt-action magazine rifle, the Norwegian Krag. In 1903 it replaced the Krag with a modified Mauser type rifle from the Springfield Armory.

HEAVY MACHINE GUN A machine gun chambered for a round of larger-than-rifle caliber, usually 12.7 mm.

HINGED FRAME A pistol in which the barrel can be hinged down to expose the chamber or chambers.

HOLD-OPEN DEVICE A catch that holds the bolt back if there is no cartridge to be chambered; a catch that holds the slide of a self-loading pistol back so that the weapon may be dismantled.

HOLLOW-POINT A bullet with a chamber or a recess at its point, which causes it to expand or even fragment when it hits its target.

LANDS The inner surfaces of a barrel, between the grooves.

LIGHT MACHINE GUN A machine gun, usually fitted with a bipod, chambered for rifle-caliber ammunition, but not capable of sustained fire.

LOCKED BREACH A weapon in which the breech-block is physically locked to the barrel during firing.

MACHINE GUN A weapon that uses gas or recoil to cycle its action and thus give continuous fire.

MACHINE-PISTOL See submachine gun.

MAGAZINE A holder for cartridges that delivers them, usually by means of spring pressure, to the action.

MEDIUM MACHINE GUN A machine gun chambered for rifle-caliber ammunition, which is capable of sustained fire.

MUZZLE The open front end of the barrel.

MUZZLE BRAKE See compensator.

OPEN BOLT A weapon in which the bolt is held back until the trigger is pulled, allowing the chamber to cool; see also closed bolt.

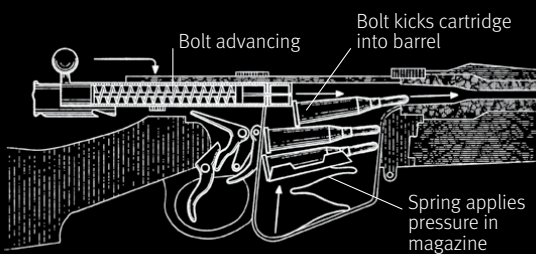
PARABELLUM The 9 mm x 19 cartridge developed by Luger for his self-loading pistol.

PRIMER Fine gunpowder used to initiate the firing sequence; a percussion cap set into a cartridge case. ▶

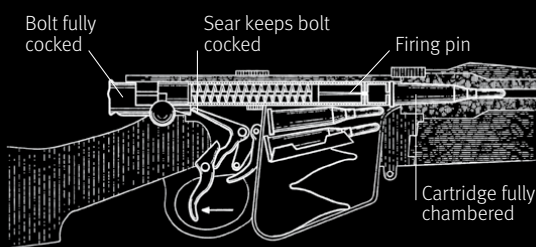
Bolt Action

HOW IT WORKS

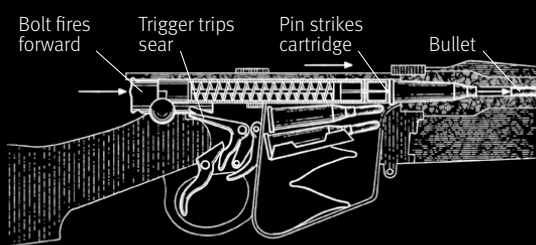
The bolt action, essentially no more complicated than the device that holds a garden gate closed, is (perhaps because it is so simple) the most sure and effective method of providing a rifle with an opening breech mechanism. The locking lugs may be at the head of the bolt or the tail, or even in both locations.



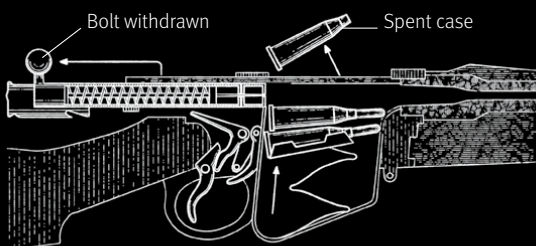
The bolt handle is lifted, rotating the body of the bolt and freeing its locking lugs, and is then drawn fully to the rear. On its return, it picks up a cartridge from the magazine and chambers it.



The bolt handle is returned to the closed position, seating the locking lugs and sealing the breech, while the firing pin is held off against its spring by the sear connected to the trigger.



Pulling the trigger trips the sear, which then releases the firing pin. Under the influence of the spring, the pin flies forward and impacts with the primer in the head of the cartridge, detonating it.



Withdrawing the bolt extracts the case by means of a hook on the bolt head, which engages with its rim. As it is withdrawn, it encounters a stop that disengages the case from the extractor, ejecting it.



Some European gunmakers used tubular magazines in bolt-action rifles, but they were soon discredited, and box magazines took their place.

SELF-LOADING FIREARMS

Mauser was the dominant force in military rifle design during the latter part of the 19th century, and went on to capture much of the global market for heavy-caliber sport rifles, too. Most other designers simply copied Mauser's work, and only in the United Kingdom, at the Royal Ordnance Factory at Enfield, was a markedly different type of bolt-action rifle, the work of an American of Scottish birth, James Paris Lee, produced in very significant numbers (though designs by other Europeans, notably the Austro-German Ferdinand von Mannlicher and the Swiss Schmidt were adopted by smaller armies).

Elsewhere in Germany, driven by Prussian militarism, increasing numbers of companies were entering the field of armaments manufacture. One, Ludwig Loewe, which had started life as a manufacturer of sewing machines, was to obtain a license to make Maxim's machine guns, and prospered as Deutsche Waffen und Munitionsfabrik (DWM), swallowing up Mauser in the process.

It was at DWM that the first workable self-loading pistol, the Borchardt C/93, was produced. The company also made most of the Mauser C/96s, and it was while working for DWM that Georg Luger produced his masterpiece, the P'08.

The latter part of the century saw the emergence of another singular force in gunmaking: John Moses Browning, a Mormon

from Ogden, Utah. Having worked for Winchester, where he produced the first pump- and self-loading shotguns, he then began an alliance with Fabrique National of Herstal, near Liège, in Belgium, and produced designs for machine guns and self-loading pistols, which were to be among the best in the world.



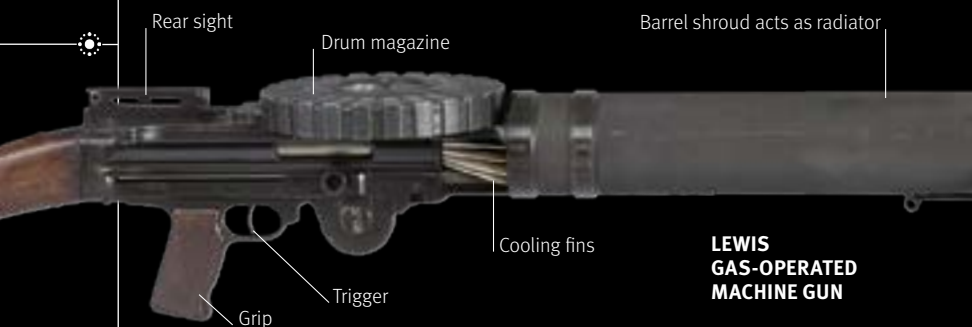
BERGMANN M18/1

The unwieldiness of the first generation of rapid-fire pistols led to the creation of the submachine gun. One of the first of these was the Bergmann M18/1, made in 1918.

FIREARMS



**MG08/15
RECOIL-OPERATED
MACHINE GUN**



**LEWIS
GAS-OPERATED
MACHINE GUN**

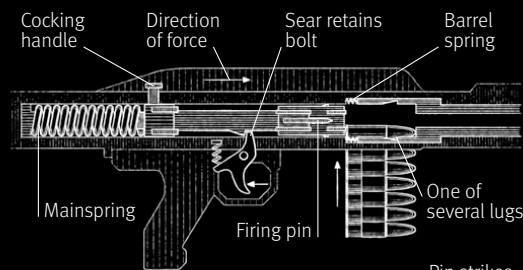


**FN P90
GAS-OPERATED
SUBMACHINE GUN**

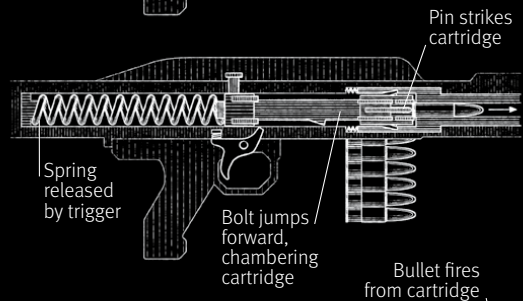
Recoil

HOW IT WORKS

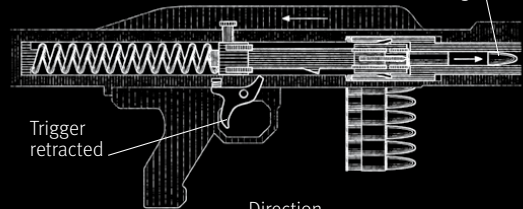
Every action, Isaac Newton's Third Law of Motion tells us, has an equal and opposite reaction. The action produced in a firearm propels the bullet down the barrel and on toward its target, and the reaction, known as the recoil, drives the gun into the shoulder or hand of the firer. Hiram Maxim was the first to realize that this reaction could be employed to cycle the gun's mechanism, and produced his machine guns on that principle.



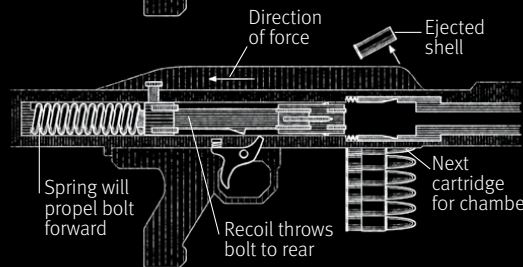
The cocking handle is drawn back against the mainspring. As it returns to battery, it strips a round from the magazine and chambers it, while the lugs that lock it in place are forced into their recesses.



During the cocking process, the firing pin is held off by the sear connected to the trigger. Pulling the trigger releases the sear, allowing the pin to fly forward and impact with the primer, detonating it.



By the time the projectile has left the muzzle, the recoil is working on the bolt to overcome the mechanism which is holding the locking lugs in place.



When the locking mechanism has been overcome, the bolt is free to travel to the rear, extracting the empty case and chambering a fresh one.

MACHINE GUNS

An American, Hiram Stevens Maxim, built his first machine gun in London in 1883. It used the weapon's recoil to extract the fired case and chamber another, cocking the action in the process. If the trigger was held down, the process repeated until the ammunition supply was exhausted (or the gun jammed, which was more likely in the early days). It took some years for the real meaning of his invention to sink in, but when it did, it changed the very nature of warfare.

Maxim's patents had expired by the outbreak of World War I, and already there were competing designs in production. But inasmuch as three of the six major combatants—Britain, Germany, and Russia (and one of the minor: the Ottoman Empire, which was armed by Germany)—relied on Maxim designs, they can fairly be said to have

dominated that conflict. Indeed, Britain and what was by then the Soviet Union, were still relying on Maxims (the former in the shape of the Vickers) throughout World War II. The French Army fielded a machine gun of its own, the gas-operated, air-cooled Hotchkiss, which had gone into production in 1893. It was considerably simpler than the Maxim, but tended to overheat—a problem from which the water-cooled gun never suffered, so long as a supply of coolant was available.

Heavy machine guns like the Maxim and the Hotchkiss, and the Austro-Hungarian Skoda and Schwarzlose, and the American Browning (the denomination refers not to the ammunition for which they were chambered, which was rifle-caliber, but to their ability to maintain heavy sustained fire) were not the only

automatic weapons found on the battlefields of World War I. Lighter, more portable weapons such as the Lewis and the lightened Maxim, known as the MG08/15, chambered for the same rounds, but which could accompany infantrymen in the assault, were also present.

DESERT EAGLE, 1983

The Israeli Desert Eagle was the first self-loading pistol capable of handling the heaviest, most powerful Magnum pistol ammunition, thanks to its gas-operated, locked-breech design.

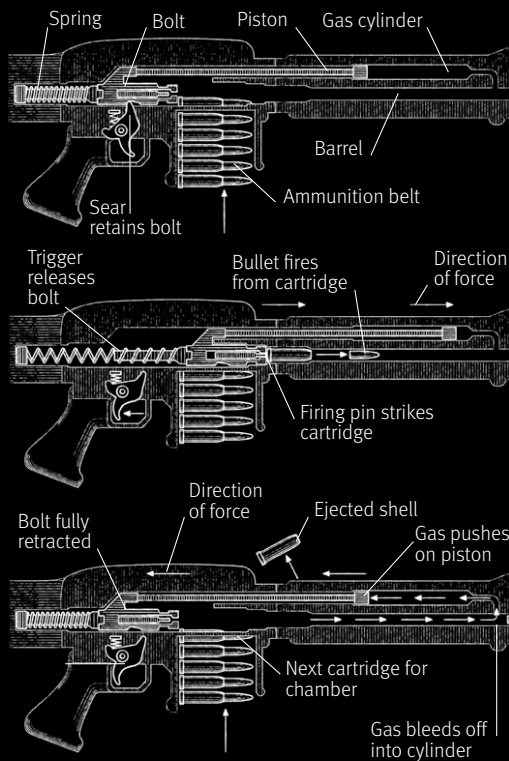




Gas

HOW IT WORKS

As an alternative to harnessing the force of the gun's recoil, it is possible to use some of the energy produced by the sudden production of a relatively large volume of gas that propels the bullet down the barrel. Some of that gas can be tapped off after the bullet has passed, and employed to unlock the gun's action and drive the breech-block or bolt to the rear, cycling it.



The bolt is drawn back against the mainspring. As it returns to battery, it strips a round from the magazine and chambers it.

On pressing the trigger, the bolt flies forward and detonates the charge in the cartridge.

The bolt is attached to a piston in a cylinder running parallel to the barrel. At its head is a vent into the barrel. As the projectile passes the vent, propellant gas is bled off, forcing the piston back. As the bolt travels to the rear, the spent cartridge case is ejected. If the trigger remains depressed, the cycle continues.

RECOIL The rearward movement of the barrel (or weapon) in reaction to the forward motion of the *bullet*.

RECOIL INTENSIFIER

A device attached to the *muzzle* that increases the *recoil* of a recoil-operated *automatic* weapon.

RECOIL OPERATION A weapon in which the *cycle* is effected by the *recoil* of the barrel or *breech-block*.

REVOLVER A weapon in which the ammunition is carried in a rotating cylinder.

RIFLING The spiral grooves cut into the barrel that induce spin on the *bullet*.

RIMLESS A type of *cartridge case* that has a recessed groove, rather than a rim, around its head, to allow the *extractor* to grip it.

RIMMED A *cartridge case* with a rimmed head to allow the *extractor* to grip it.

SEAR Part of the firing mechanism that connects the *trigger* to the *cock*, *hammer*, or *striker* by engaging in a *bent* in it.

When the trigger is pulled, the sear clears the bent, allowing the hammer to fall.

SELECTIVE FIRE A weapon that can fire single rounds or automatically.

SELF-LOADING A weapon in which the act of firing a round recocks it, having chambered a fresh cartridge.

SILENCER A device at the *muzzle* that slows the propellant gas, by diverting it through baffles, and also slows the *bullet* to below the speed of sound.

SUBMACHINE GUN A hand-held *automatic* weapon firing *pistol-caliber* rounds.

TRIGGER The short lever that trips the *sear* out of the *bent* on the *cock*, *hammer*, etc. to initiate the firing sequence.

WINDAGE The adjustment of a sight to compensate for the effect of a crosswind upon the *bullet*.

ZEROING Adjusting a weapon's sights so that the point of aim and the point of impact are the same.

Toward the end of World War I, the rifle-caliber machine guns were joined by a much smaller automatic weapon, chambered for pistol ammunition and designed to put automatic firepower into the hands of the individual infantryman. The Bergmann MP18/I played only a very minor role, but it was to be a prophetic one. By the time war broke out in Europe again, the submachine gun had become ubiquitous. That, however, is not to say that its role has ever been completely understood in anything but close-quarters combat. Indeed many, even now, would maintain that its best feature is the shock it can generate, especially in a confined space, for such a weapon, capable of firing up to 1200 rounds per minute, is virtually impossible to control if the trigger is held down for any length of time. It is significant

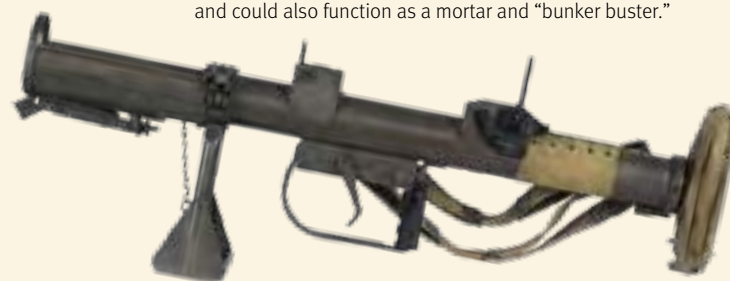
that perhaps the best of the genre in modern times, Heckler & Koch's MP5, is available shorn of its rapid-fire setting. The police officers (and many of the soldiers) who carry such weapons do so not for their firepower, but for the increase in accuracy they offer over a pistol, thanks to their longer barrels, and for the greater capacity of their magazines.

Submachine guns have never been seen as replacements for the infantryman's assault rifle. Indeed, thanks to the drastic modifications the assault rifle has undergone, there is now more reason than ever to suggest that the submachine gun will soon join the pistol having no effective military role beyond self-defense. More than any other man-portable weapon,

the assault rifle (much-reduced in weight and length, thanks to the introduction of "bullpup" designs, which have the mechanism housed within the shoulder stock, and chambered for much lighter ammunition) has changed to accommodate the nature of the task facing the soldier who carries it.

PROJECTOR, INFANTRY, ANTI-TANK, 1942

The British Army's PIAT of World War II vintage was perhaps one of the most bizarre weapons of the 20th century, yet despite its simplicity, it was capable of disabling even heavy tanks at up to a hundred yards, and could also function as a mortar and "bunker buster."



ARMOR AND HELMETS



GERMAN GOTHIC

MUGHAL

JAPANESE SAMURAI

THE most ancient form of armor was probably made of animal hides, followed by leather or cotton. As metal technology progressed, bronze, and then iron armor appeared. Greek hoplites from the 7th century BCE wore a bronze helmet, a bell-shaped corselet of leather or bronze, and bronze greaves for the shins.

During the early empire, the Romans developed banded-iron armor (called *lorica segmentata*), with reinforced sections across the shoulder, that allowed for more flexible movement. Later Roman infantry tended to be less heavily armored, although their cavalry (or cataphracts) wore a coat of heavy mail.



BADGE OF RANK

The gorget was among the last pieces of armor to be worn on the battlefield. By the 18th century, a reduced version had become a badge marking out officers.

Mail then remained the dominant form of armor in western Europe until the 15th century.

Steppe nomads, such as the Turks and Mongols, wore both scale and *lamellar* armor, the latter constructed of individual pieces (or *lamés*) laced together in horizontal rows (rather than being sewn on). The arrangement of protective plates thus formed could become quite elaborate, reaching the summit of its development in the *O-Yoroi* armor of Japanese samurai. Their hardened leather

plates coated in lacquer to give strength equal to steel also provided greater flexibility and lightness.

TECHNOLOGICAL IMPROVEMENTS

By the 15th century, the danger from improved weapons including the longbow, crossbow, and firearms meant that chain armor, well adapted for deflecting sword blows, became more vulnerable. Small plates or discs of steel had already been added to armor to protect the most vulnerable areas, and these now evolved into entire suits of toughened steel.

Gradually, from the 16th century, armor was reduced to save weight—and expense—for foot soldiers. For the cavalry, however, back- and breastplates (or cuirasses) survived into the 19th century, and in ceremonial form even later. With the development in the 20th century

ARMET Bowl-shaped helmet with cheek plates meeting at the chin, attached by hinges

ARMING CAP Quilted cap worn under a helmet

AVENTAIL Skirt of mail to defend neck

BANDENHELM Germanic helmet held together by central band or ridge

BARD Armor designed for a horse

BASINET Conical or globular skull, often without visor

BESAGEW Small discs laced to the shoulder to defend armpit

BEVOR Cupped chin defense

CHAPEAU DE FER Simple metal domed helmet

COOLUS HELMET Late republican/early imperial Roman helmet with basin shape

CORINTHIAN HELMET Classic Greek hoplite helmet

CUISSE Armor for the thigh

DO Japanese cuirass

GAUNTLET Hand armor of small plates attached to leather

GORGET Neck armor, often fixed to the plate with a latch or pin

GREAT HELM Large helmet enclosing entire skull and neck

GREAVE Plate to defend lower leg

HAIDATE Skirtlike guard to protect groin

HAUBERK A mail shirt

KABUTO Japanese helmet

KOTE Armored sleeves in samurai armor

MEMPO Ornamented face mask in Japanese armor

POLEYN Knee defense, often articulated and with projecting wings

REREBRACE Tubular defense for upper arm

SABATON Foot armor of articulated plates ending in toe-cap worn over leather shoes

SALLET Helmet with flared tail and visor

SPANGENHELM Germanic helmet of segmented construction

TOP Indian Mughal helmet with mail veil

VAMBRACE Tubular defense for forearm



of lightweight materials such as Kevlar, which could impede bullets, body armor made a return to the battlefield in the form of ballistic jackets.

HELMETS

After the fall of Rome, the techniques for creating helmets from a single sheet of iron disappeared. Segmented helmets such as the Bandhelm, popular among the Vikings, replaced them, with a band holding the two parts of the bowl of the helmet together.

Such early medieval European helmets did not protect the whole face, and just as body armor became heavier, so did head protection, leading to the evolution by the 12th century of “Great Helms” that covered the whole face and neck. Again, these proved too heavy and impractical and lighter versions, such as basinets,

appeared by the later Middle Ages.

Turkish and Mongol helmets often took a peaked form, a version in metal of the steppe nomads’ felt cap, while the Japanese samurai wore elaborate helmets of lacquered leather, with a *mempo* for additional protection. With the increased use in firearms, helmets began to disappear until improved designs, which could defend against bullets and shrapnel, led to a renaissance in helmets, from World War I “tin-pot” helmets, to the reinforced Kevlar helmets of the modern infantryman.

SAMURAI HELMET

Japanese samurai helmets came in a wide variety of styles. This Hineno *zunari bachi* is a “head-shaped” version, with a helmet bowl of simplified construction, lacquered in red, with its frontal plate finished in gold lacquer.





THE ANCIENT WORLD







THE FIRST WARRIORS

This rock painting from Algeria shows one of the earliest images of warfare, as ranks of warriors armed with hunting bows confront each other.

The earliest weapons—the bow, spear, club, and ax—had their origins in hunting, but it was in warfare—the competition for resources conducted by violent means—that they were honed and perfected as killing tools. Although the basic design of these weapons, and the materials used to make them, remained largely unchanged throughout the ancient period, from stone to copper, bronze and then iron, their efficacy (and the organization of those who wielded them) increased.

IN PREHISTORIC TIMES there were no armies as such, merely *ad hoc* bands of warriors armed with stone weapons for raids on neighboring groups. But, as Neolithic agricultural settlements coalesced into villages and then, from the 4th millennium BCE, into towns and cities with organized ruling and priestly classes, the means and weapons for waging war increased correspondingly in sophistication and effectiveness.

Agriculture implied the concentration of greater resources in a fixed position, and the need to defend food, manpower, and minerals gave rise to the first walled city, Jericho, and fortified villages such as Çatal Hüyük in modern Turkey. It was in the fertile river valleys of Egypt, India, and, more particularly in the Sumerian culture of Mesopotamia that this process reached its fruition, with the growth of the earliest armies from around 3000 BCE.

The Sumerians inhabited many city-states, existing in an almost continuous state of warfare fueled by competition for the bounty of the “land between the two rivers.” The

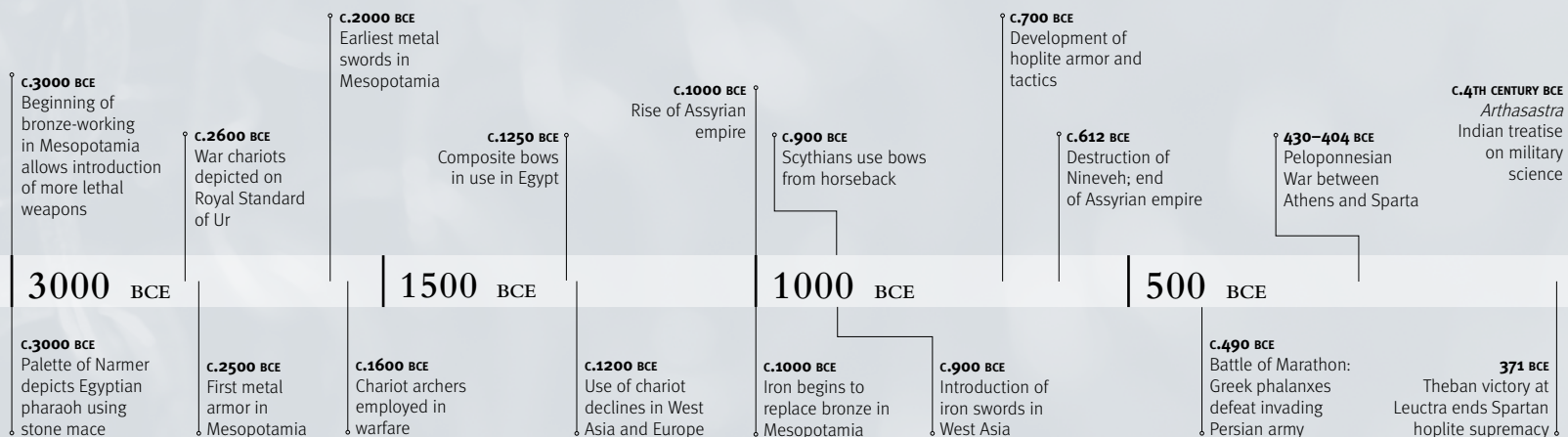
“Royal Standard of Ur,” excavated from one of the most successful of these city-states, carries the earliest depiction of an organized armed force, led by its *lugal* or king. It consists of a mixture of light infantry bearing javelins and battle axes (but no shields) and helmeted heavy infantry wielding a mass of longer spears. The Sumerian chariots were cumbersome affairs with solid wheels drawn by four ass-like creatures—hardly practical vehicles for warfare. A commemorative tablet known as the Stele of Vultures shows that by c.2450 BCE, the Sumerians were fighting in a tight formation of helmeted spearmen, which prefigured the phalanx—the mainstay of infantry warfare for over 2,000 years.

The Sumerian cities were eventually overcome by Sargon of Agade (c.2300 BCE), who built the world’s earliest empire, campaigning with an army that was the first to exploit mixed arms, combining light troops with heavier infantry and archers. Although warfare continued to plague the region, the pace of technological change was relatively

slow, mainly consisting of refinements of existing weaponry. One example of this is in the improved molding that allowed the Mesopotamian battle ax to become double-bladed, inflicting appalling slashing and gouging wounds, and leading, in turn, to the increased use of metal helmets.

TECHNOLOGICAL INNOVATIONS

A series of cultural and technological developments in the 2nd millennium BCE changed the face of warfare and allowed states to project their power ever further, garner more resources, and repeat the process until they came up against a stronger foe. One of these developments was the widespread domestication of the horse. At the same time, the perfection of bent-wood techniques, allowed spokes to be used on chariot wheels. Along with the development of a practical composite bow that allowed rapid fire from these new chariots, these developments helped New Kingdom Egypt—which though long politically united, had remained very



conservative in its use of military technology—to launch a devastating series of campaigns in the Middle East. The chariots' principle task was to disrupt opposing infantry and cut them down as they fled. Chariots rarely engaged each other directly, as at Kadesh (c.1275 BCE), the earliest well-documented battle, where the army of Pharaoh Rameses II fought a draw with the Hittites, who had become Egypt's principal rival.

The discovery in around 1200 BCE of hot-hammering and quenching iron in water to give stronger and longer-lasting blades added a new element of lethality to warfare, and

also helped the spread of longer stabbing and slashing swords to supplant the daggers and axes, which had hitherto been the most common bladed weapons.

THE FIRST STANDING ARMY

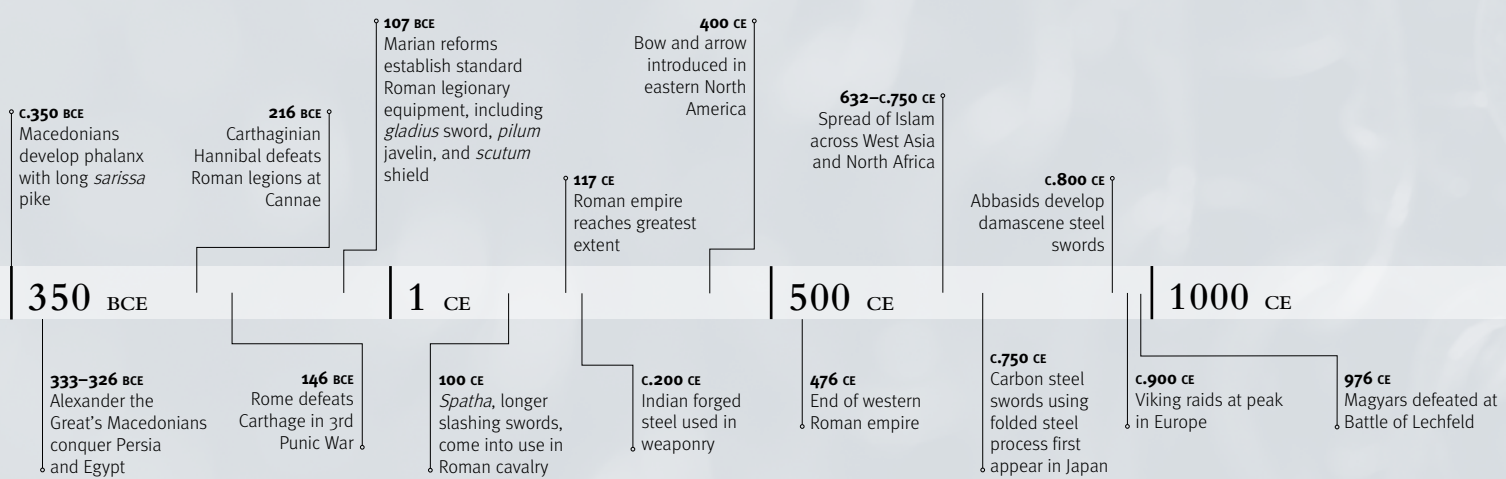
It was the Assyrians who were the first to really exploit this development. Employing the earliest standing army—as many as 100,000 strong according to one text—and exploiting their military prowess and reputation for ruthless extermination of those who opposed them, they carved out an enormous empire encompassing most of Mesopotamia. The

Assyrians possessed a well-defined chain of command, with specialist units of cavalry, armed with iron-tipped spears, slingers, and bowmen, whose massed fire could be devastating to an enemy, and which led to an increased use in armor, such as knee-length scale tunics. They also developed extensive expertise in siege warfare, and in the taking of Lachish (701 BCE) deployed siege engines that were not surpassed until Roman times. The Assyrian state under kings such as Tiglath-Pileser III (745–27 BCE) was capable of fighting sustained campaigns and defending a large area with mobile chariot forces. In the end, however, the multinational nature of its empire was to prove its undoing, as its resources became overstretched and a series of revolts caused its rapid collapse in c.612 BCE. The Persians, too, built a multiethnic empire from the mid-6th century BCE, but on a magnified scale, stretching from the borders of India to the Aegean. At the heart of their army was an elite corps of “Immortals,” fighting with short spear and bow from behind a shield-wall. As the Persian domain expanded, light cavalry from Media, light infantry from the mountain regions, and even a camel-corps from the Middle East were added. Ironically, despite this well-balanced combination, the Persians were eventually defeated by an apparently tactically inflexible force, the Greek hoplite army.

Greece was ill-suited to cavalry, its generally mountainous terrain was better for to small-scale infantry warfare. Emerging by 800 BCE from the dark age of heroic warfare depicted in the epic poems of Homer, the Greek city-states relied on massed ranks of infantry soldiers, or hoplites.

ASSYRIAN SIEGE

Archers formed a key component in an Assyrian army whose sophistication enabled it to fight pitched battles, send chariot forces across large distances, and deploy complex siege engines against any city that dared oppose it.



Wielding a large shield held by a central hand-grip that protected only the left-side of the body, hoplites were dependent on their neighbor to shield their unguarded right side. Deployed in a phalanx, eight to twelve men deep, wielding long spears and protected by bronze helmets that left only the eyes and mouth exposed, the hoplites presented a shield and spear wall that opponents found very difficult to penetrate. The earliest depiction of such a phalanx occurred in around 670 BCE. By the time of the Persian invasion in 490 BCE, the development of this style of warfare, which depended on the cohesion of the soldiers within it, and their momentum as a mass, had been perfected by the Spartans, who possessed a full-time army trained in basic drills and able to conduct maneuvers such as facing an enemy coming from two directions. At Marathon (490 BCE) and Plataea (479 BCE), the Persians crumbled in the face of a hoplite charge, unable to

counter with their cavalry, and undermined by their inferior discipline and cohesion.

THE ARMY OF ALEXANDER THE GREAT

By the 4th century BCE, it was a very different Greek army that took the fight to the Persians. The Macedonian army of Alexander the Great resolved the fundamental weakness of the hoplite force—its lack of a mounted striking arm. Alexander's "Companions," an elite cavalry unit, was trained to fight in a wedge-shaped formation ideal for penetrating other cavalry formations and disrupting infantry shield-walls. Added to this were the foot-companions, who fought on foot in a phalanx formation and were armed with the *sarissa*, a pike around 19½ ft (6 m) long. The *sarissa* of the foremost rank would project around 13 ft (4 m) in front of the phalanx, that of the second rank 6½ ft (2 m) and so on, creating an obstacle to deter all but the most determined assailant and which could also deflect missiles.

The weight of the *sarissa* was such that the members of the phalanx wore just light leather corselets and *greaves* and carried only daggers as sidearms. In battle, the Companions would generally punch a hole in the enemy line, which the *sarissa* phalanx would exploit. The tactical genius of Alexander, who used oblique formations, feints, and envelopments to devastating effect, combined with the tactical flexibility that the mixed cavalry-infantry army of Macedonia permitted, enabled him to defeat the numerically superior Persians at Issus (333 BCE) and Gaugamela (331 BCE) and take over their empire wholesale. What they won through military cohesion, the Macedonian successors of Alexander lost through political fractiousness, and by the 1st century BCE, the successor states in Asia and Africa were much weakened, while a manpower crisis in Greece meant traditional hoplite armies were increasingly difficult to sustain.

THE RISE OF ROME

It was into this arena that the new Mediterranean power of Rome encroached, backed up by a military force of unparalleled efficiency—the legion. Rome overcame its enemies, in part by its capacity to keep large armies constantly in the field (as many as 13 legions by 190 BCE). The Romans could survive even such a devastating defeat as the Carthaginian Hannibal inflicted on them at Cannae in 216 BCE—but their enemies had no such luxury. The organization of the legions developed over time, but by the early 1st century CE, had reached their full development (see box). It was above all the professionalism of the legionaries—who each served for 25 years—and the Roman Empire's superior logistics, enabling it to equip, train, and transport large armies, that helped it to annex a huge area of Europe, North Africa, and West Asia and hold it for over four centuries.

The Romans excelled in pitched battle and sought to force such confrontations whenever possible. Against more mobile foes, or

THE ROMAN ARMY

The Roman Empire's survival for over 400 years is a tribute to its ability to modify its military organization to face changing strategic needs. Under Marius in the late 2nd century BCE, extensive reforms created the classic Roman legion, with standardized equipment supplied by the state, the cohort of around 100 men as the tactical unit, and a legion strength of about 4–5,000 men. Legionaries bore the short *gladius* (sword), the *pilum* (heavy throwing spear)—designed to break on impact—the oval *scutum* (shield), and, from the 1st century CE, generally *lorica segmentata* (armor). The

legions were supported by auxiliary troops, with more varied equipment, and specialists such as mounted archers and slingers. Under the later empire, legion sizes became much smaller—as little as 1,000—while the role of the cavalry and units recruited from Germanic tribes increased.



CARVED TABLET

EGYPTIAN SPEARHEAD

This spearhead, discovered wrapped in a linen binding, is typical of the weapons carried by Pharaonic armies from the Old Kingdom right up until military changes during the New Kingdom brought chariot-borne archers to the fore.



opponents who had no cities or fixed centers to defend, however, the Roman way of war faltered. When defending long, fixed frontiers the legions could not cover all possible points of attack. Long vulnerable to mounted horse archers, such as the Parthians who overwhelmed Crassus at Carrhae in 53 BCE, the Romans also found it increasingly difficult to absorb the sapping pillage and run tactics of the German warrior federations that evolved from the 3rd century. The late empire, from the time of Gallienus (260–68 CE), came to depend more on a mobile field force (the *comitatenses*), with an enhanced heavy cavalry arm, wielding longer *spatha* swords. With their suits of mail, and sometimes carrying lances, these armored soldiers began to resemble the knights of early medieval times. At the same time, the frontier troops (*limitanei*), starved of resources and motivation, became increasingly unable to withstand the successive waves of Goths, Vandals, Huns, and other barbarian invaders.

AFTER THE ROMANS

When the Roman Empire in the West finally collapsed in 476 CE, the Germanic successor states inherited many of its legal and administrative systems. The most powerful of these, the Frankish kingdom, was able to project its power beyond the Rhine, into Italy and even northern Spain in the late 8th century under Charlemagne. Fighting in mailed byrnie (leather jackets) and armed with long swords and axes, the Frankish army's superior arms and organization, along with its use of auxiliaries from conquered nations such as the Saxons and Carinthians, made it invulnerable to everything save the political division and dynastic squabbling that fragmented the kingdom in the 9th century.

The break-up of the Frankish Empire came just as Europe and Byzantium—the remnant of the Roman Empire in the East—faced fresh military challenges. From the north came the Vikings, at first small groups of ship-borne raiders preying on lightly-defended coastal

territories, and then larger forces carried inland on ponies or by portage along rivers to bring devastation as far afield as Anglo-Saxon Wessex, Paris, Kievan Rus, and Constantinople. Fighting with double-edged swords 28½–32 in (70–80 cm) in length, light spears for throwing and heavier ones for thrusting, and long-handled broad-bladed battle axes, the Vikings inspired terror in Europe for over 250 years.

Out of the Middle East, meanwhile, came another military force, which was to endure far longer. From the 630s, Arab armies, united under the banner of the new religion of Islam, swept through the peninsula and then outward to overwhelm the tired autocracies of Byzantium and Persia. The Islamic victory was not achieved at first through any superior technology—although the Arab armies' use of the camel for transportation doubtless assisted them in the desert terrain of many of their victories—but through the cohesive inspiration of ideology. When the new religion spread to the Turkic horse archers of the Central Asian steppes by the 9th century, the combination threatened for a time to be unstoppable.

TERRACOTTA WARRIOR

The terracotta army, buried in the tomb of Emperor Huang Di, who unified China c.220 BCE, is testament to the variety and sophistication of Chinese armies of the time.



THE FIRST WEAPONS

THE ABILITY OF HUMAN BEINGS to manufacture tools was an early step toward gaining mastery over their environment. Among the first tools to appear were simple hand blades and axes made from hard rock; they would have been used to kill and dismember animals, but they also had the potential to be employed against other humans. The distinction between hunting and military weaponry necessarily remained blurred for many millennia. With the invention of the handle or shaft, and the development of projectile weapons—the spear and, above all, the bow and arrow—a revolution in hunting and fighting was underway.



PALEOLITHIC BLADES

To be able to cut was of prime importance for early man, and these blades—dating back to about 40,000 BCE—would have been used to dismember animals that had been killed by paleolithic hunters. Such blades were capable of severing sinew, and separating the skin from the animal's flesh.

DATE	c.40,000 BCE
ORIGIN	UNKNOWN
LENGTH	4 IN (10 CM)



Area held by hand

Serrated teeth for sawing

Narrowed point

Rough cutting edge

HAND AX

A key tool of the paleolithic age, the hand ax was shaped to provide both a cutting edge and a point. Although hand axes were essentially domestic tools, they were capable of inflicting savage wounds against both animals and people. Their cutting ability made them highly prized implements.

DATE	c.250,000–70,000 BCE
ORIGIN	UNKNOWN
LENGTH	6 IN (15 CM)



Fine cutting edge

Sharp broad point

FLINT DAGGER HEAD

A development of the hand ax, this dagger is fashioned from flint, a hard rock readily available in areas of chalk downland and capable of taking a sharp edge. A piece of flint would be repeatedly struck by a stone hammer, knocking off small flakes of flint until a fine edge remained.

DATE	c.2000 BCE
ORIGIN	UNKNOWN
LENGTH	6 IN (15 CM)



SERRATED FLINT KNIFE

A development of the simple flint dagger is the serrated knife shown here. The knife's teeth make possible a sawing action, and this provided the paleolithic hunter with an opportunity of cutting through harder objects such as bone, gristle, and—during the Ice Age—frozen meat.

DATE	1,500,000–10,000 BCE
ORIGIN	UNKNOWN
LENGTH	8 IN (20 CM)





FLINT HAND DAGGER

By lashing the flint blade to a wooden shaft with a binding of sinew or leather strips, the simple hand dagger was transformed into a deadly weapon of war. The addition of the shaft enabled the Stone-Age fighter to plunge the blade into his opponent with the full force of his arm.

DATE 1,500,000–10,000 BCE
ORIGIN UNKNOWN
LENGTH 12 IN (30 CM)

EARLY ADZE

The stone head of the adze is inserted into a sleeve made from antler-horn, which is then bound to the wooden shaft by strips of leather. The adze is primarily a domestic or agricultural tool, but it does not take too much imagination to see this as a forerunner to the battle ax.

DATE 8000–4000 BCE
ORIGIN UNKNOWN
LENGTH 8 IN (20 CM)



STONE AXHEAD

A dual-purpose tool, the stone ax could have been used for clearing vegetation, but would have been capable of smashing in a human skull. The addition of a wooden handle provided greater reach and power. This axhead was dredged from the Thames River in London.

DATE 4000–2000 BCE
ORIGIN ENGLAND
LENGTH 8 IN (20 CM)



SMALL CLOVIS POINT

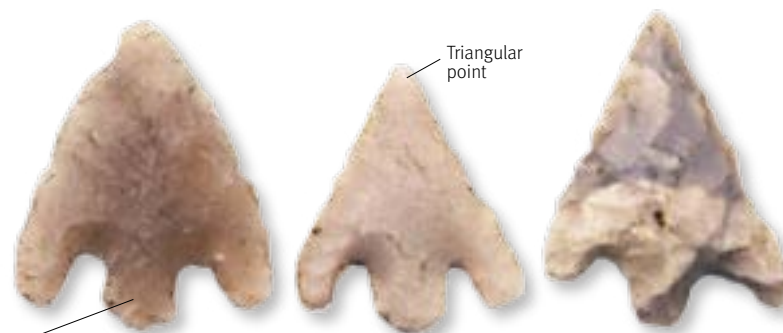
In 1932 this Ice-Age spearhead was unearthed in Clovis, New Mexico, along with other weapon points. The broad blade of this spearhead could inflict severe wounds. The binding of the spearhead to a long wooden shaft gave the fighter an opportunity to throw it at his opponent with great force, from a relatively safe distance.

DATE c.10,000 BCE
ORIGIN US
LENGTH 4 IN (10 CM)



Reproduction wooden handle

Reproduction wooden handle



FLINT ARROWHEADS

The bow was a leap forward in weapon technology, enabling the archer to fire from a distance with power and accuracy. Made from flint, these arrowheads have barbs that would embed themselves deep inside the victim, ensuring that any attempt to remove them would be difficult.

DATE c.2700–1800 BCE
ORIGIN UNKNOWN
LENGTH 2 IN (5 CM)

MESOPOTAMIAN WEAPONS AND ARMOR

ORGANIZED WARFARE ORIGINATED in the Sumerian city states of southern Mesopotamia in around 3000 BCE. Armor was made from leather, copper, and bronze, and the chief weapons were the bow and spear. Mobility was provided by chariots, at first four-wheeled vehicles drawn by asses, but improved to become light, horse-drawn, two-wheeled platforms for archers and spearmen. Improvements in city fortification led to developments in siege warfare techniques, such as the use of battering rams and scaling towers.

CEREMONIAL DAGGER

Excavated from the burial site of the Sumerian Queen Pu-Abi in around 2500 BCE, this ceremonial dagger is of the highest quality—a suitable weapon for a monarch to carry on her journey to the afterlife. The blade and scabbard are made from gold, while the hilt is constructed from lapis lazuli finished with gold decoration.

DATE c.2500 BCE

ORIGIN SUMERIA

LENGTH 9½–12 IN (20–30 CM)



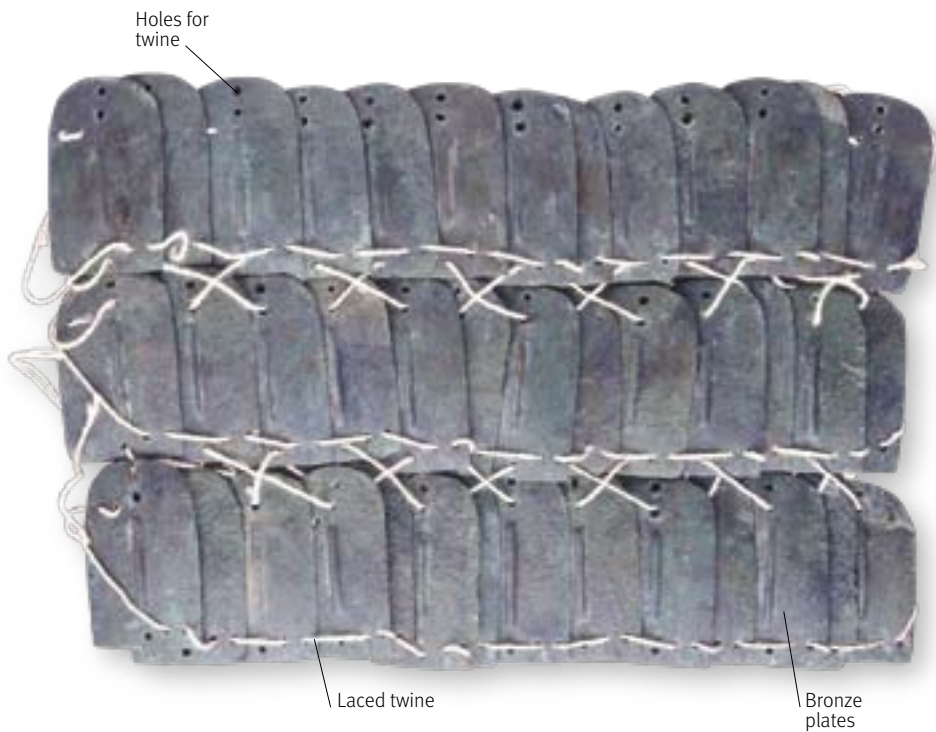
HELMET OF MESKALAM-DUG

Made from an alloy of gold and silver, this ceremonial helmet was found in the Sumerian city of Ur and dates back to the third millennium BCE. Known as a wig helmet, the decoration mimics the hairstyle worn by Sumerian kings of the period.

DATE c.2500 BCE

ORIGIN SUMERIA

LENGTH 8½ IN (22 CM)



Holes for twine

Laced twine

Bronze plates

ASSYRIAN SCALE ARMOR

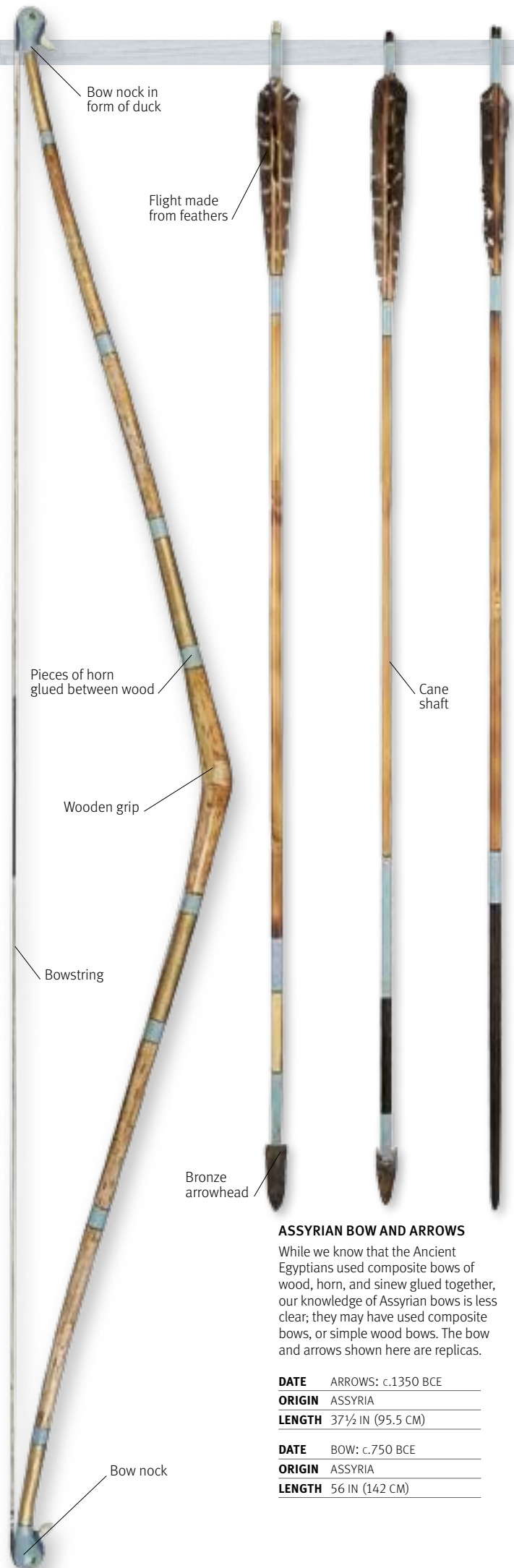
Constructed from bronze, this early example of *lamellar* armor—where small plates are laced together—was worn by an Assyrian warrior. Such armor was popular in the Middle East until the end of the Middle Ages.

DATE	1800–620 BCE
ORIGIN	ASSYRIA
LENGTH	EACH PLATE: 2 IN (5 CM)



ASSYRIAN WARFARE

Assyrian warriors, here depicted on a relief carving, in the Battle of Til-Tuba c.650 BCE. Some men are well protected with armor and large shields, and the two main Assyrian weapons, spear and bow, are clearly in evidence.



Bow nock in form of duck

Flight made from feathers

Pieces of horn glued between wood

Cane shaft

Wooden grip

Bowstring

Bronze arrowhead

Bow nock

ASSYRIAN BOW AND ARROWS

While we know that the Ancient Egyptians used composite bows of wood, horn, and sinew glued together, our knowledge of Assyrian bows is less clear; they may have used composite bows, or simple wood bows. The bow and arrows shown here are replicas.

DATE	ARROWS: c.1350 BCE
ORIGIN	ASSYRIA
LENGTH	37½ IN (95.5 CM)
DATE	BOW: c.750 BCE
ORIGIN	ASSYRIA
LENGTH	56 IN (142 CM)

ANCIENT EGYPTIAN WEAPONS AND ARMOR

FROM APPROXIMATELY 3000–1500 BCE the Egyptian army fought mainly on foot, its soldiers protected by large wooden shields and armed with bows, spears, and axes. The long struggle with the people of Hyksos, who came to rule parts of Egypt in the second millennium BCE, brought about a change in weapon technology. Helmets, armor, and swords became more common, and chariots provided highly mobile archery platforms.

Crocodile-skin helmet

CROCODILE-SKIN ARMOR

The crocodile was revered by the Ancient Egyptians, who believed that the wearer of its skin would take on the strength and attributes of this fearsome animal. Crocodile cults continued into classical times, and the wearing of crocodile armor was popular with Roman soldiers garrisoned in Egypt.

DATE 3RD CENTURY CE

ORIGIN EGYPT

LENGTH CUIRASS: 34 IN (88.5 CM)



Mummified remains of cuirass

Attachment holes

BRONZE AXHEAD

The Egyptian enthusiasm for axes led to the development of a wide variety of axhead shapes. This broad, scalloped example has small holes where the head is bound to the shaft. The distinctive shape of the blade makes possible a wide slashing action, effective against opponents wearing little or no armor.

DATE 2200–1640 BCE

ORIGIN EGYPT

LENGTH 6 IN (17.1 CM)



Thin, curved, scalloped ax blade

BRONZE SPEARHEAD

This spearhead is typical of those carried by Egyptian infantrymen, whose main weapon was the spear. Made from bronze, it was covered in fine linen cloth, whose weave is apparent in this view. This weapon would have been used mainly for thrusting, not thrown as a javelin.

DATE c.2000 BCE

ORIGIN EGYPT

LENGTH 10 IN (25 CM)

Socket for insertion of shaft





FLINT ARROWHEAD

The Egyptians were early exponents of the bow, and it formed the most effective element within their army. The first composite bow was portrayed on a victory monument as early as 2800 BCE. Early arrowheads were made from flint, subsequently to be replaced by bronze.

DATE 5500–3100 BCE
ORIGIN EGYPT
LENGTH 2 IN (6.1 CM)



BRONZE HEAD

Used either to arm a thin spear or an arrow, this bronze head is notable for its pronounced barbs. Although expensive to produce, bronze arrowheads were widely used by the Egyptians, who fitted them to shafts made from the long reeds growing along the Nile River.

DATE 1500–1070 BCE
ORIGIN EGYPT
LENGTH 2 IN (7 CM)



“SMITING A LION” CEREMONIAL SHIELD

The discovery of the tomb of Tutankhamun (who reigned c.1336–1327 BCE) provided a mass of information on Egyptian life, including the weapons and tools of the period. This ceremonial shield shows the king slaying a lion while armed with an unusual type of sword called a *khepesh*.

DATE 1333–1323 BCE
ORIGIN EGYPT
LENGTH 33 IN (85 CM)

Tutankhamun guarded by falcon god Horus

“LION KING” SHIELD

One of the eight ceremonial shields discovered in the annex to Tutankhamun’s tomb, it depicts the king in the guise of a lion scattering his enemies before him. This is one of a number of depictions showing Tutankhamun adopting a martial pose. Simple wooden versions of this type of shield would have been carried by Egyptian foot soldiers.

DATE 1333–1323 BCE
ORIGIN EGYPT
LENGTH 33 IN (85 CM)

Intricate openwork wood carving

Pattern of original fine Egyptian linen

Leaf-shaped spearpoint



ANCIENT EGYPTIAN WEAPONS AND ARMOR



Detailing influenced by Middle Eastern design

Wide, double-edged metal blade

Gold gilt handle

SHORT SWORD

Until the New Kingdom (c.1539–1075 BCE) the sword had not been highly regarded by the Egyptians, but military encounters with warlike peoples from the Middle East encouraged the development of edged weapons capable of penetrating armor. This broad-bladed short sword has a gold gilt handle, almost certainly that of a member of the Egyptian royal family.

DATE 1539–1075 BCE

ORIGIN EGYPT

LENGTH 12½ IN (32.3 CM)



Wooden shaft



Decorated gold handle

Double-edged iron blade

A PHARAOH'S DAGGER

Belonging to Tutankhamen, this gold-handled dagger has an iron blade rare in this period. The Egyptians had no direct access to iron ore and were dependent on supplies from the Middle East—often under the control of their enemies—which consequently made the production of iron weapons a difficult business.

DATE c.1370–1352 BCE

ORIGIN EGYPT

LENGTH 16¾ IN (41.1 CM)



Wooden shaft

Mushroom-shaped pommel

LONG SWORD

Featuring a large, mushroom-shaped pommel, this sword has a copper blade, while the handle is covered in gilded gold. Although copper was readily available in Egypt, it lacked the strength of bronze and iron, and the blade could not be made to take a sharp edge.

DATE 1539–1075 BCE

ORIGIN EGYPT

LENGTH 16 IN (40.6 CM)



Gold gilt handle

Double-edged copper blade



Wooden shaft

BATTLE AX

This heavy bronze axhead is inserted into a wooden shaft and then bound securely in place. Such axes would have been capable of penetrating leather, and light bronze armor.

DATE 1630–1520 BCE

ORIGIN EGYPT

LENGTH 16¼ IN (41.1 CM)

Axhead inserted into groove in shaft



Original binding

Open metalwork axhead

Intricate warrior-on-horseback design



Bronze axhead

CEREMONIAL AX

The ax (and the mace) were weapons that had strong associations with power and prestige, and ceremonial versions were carried by Egyptian rulers. Typically, a scene showing the triumph of the Pharaoh would be engraved on the axhead, although in this instance, a warrior is depicted on horseback in an open metalwork design.

DATE 1539–1075 BCE

ORIGIN EGYPT

LENGTH 17 IN (43.5 CM)

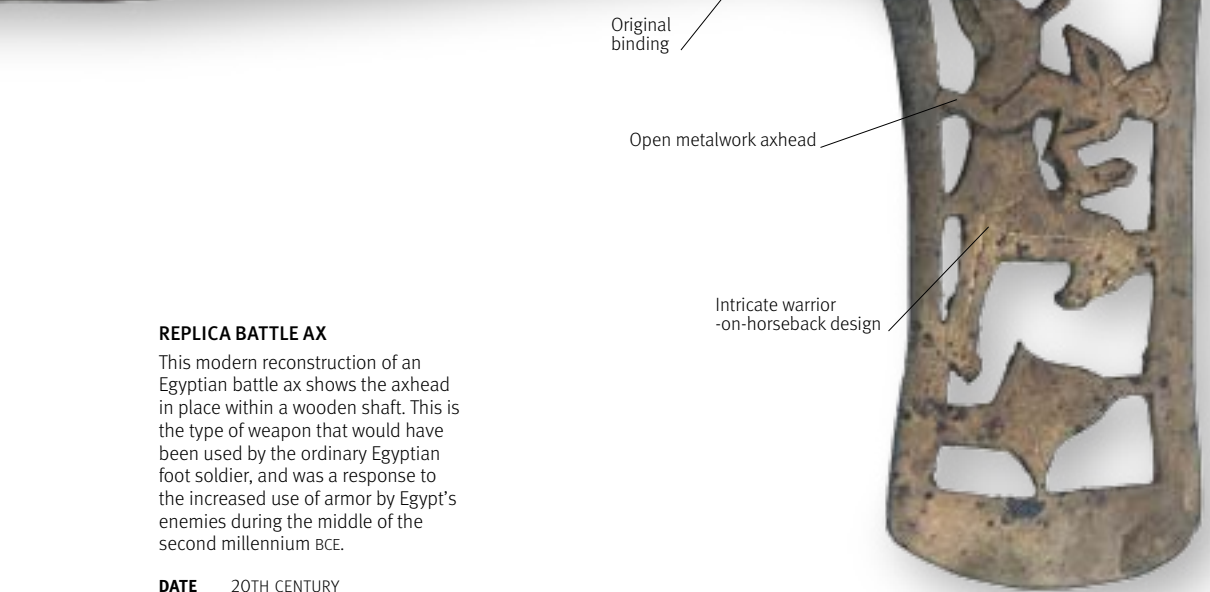
REPLICA BATTLE AX

This modern reconstruction of an Egyptian battle ax shows the axhead in place within a wooden shaft. This is the type of weapon that would have been used by the ordinary Egyptian foot soldier, and was a response to the increased use of armor by Egypt's enemies during the middle of the second millennium BCE.

DATE 20TH CENTURY

ORIGIN EGYPT

LENGTH 16½ IN (42 CM)



Leather strip binding to lash axhead to shaft



Cutting edge of blade



TUTANKHAMUN

Egyptian King Tutankhamun (r.1332–1322 BCE) shoots arrows at retreating enemies from his chariot. Evidence that bows and arrows were among the most common weapons of this period is found in tomb paintings, on coffins, and from excavated finds. These weapons would have been used alongside axes and short swords.



ANCIENT GREEK WEAPONS AND ARMOR

WARFARE IN CLASSICAL GREECE was centered around the hoplite, a heavily equipped foot soldier armed with a spear and sword, and protected by a large round shield, bronze helmet, bronze or leather cuirass, and greaves. Hoplites fought closely together, forming a wall of shields in a phalanx that maximized their protection while enabling them to use their spear. The hoplite phalanx was supported by light infantry armed with bows and sling shots



Spearpoint

Wide leaf-shaped spear blade

HOPLITE SPEAR BUTT

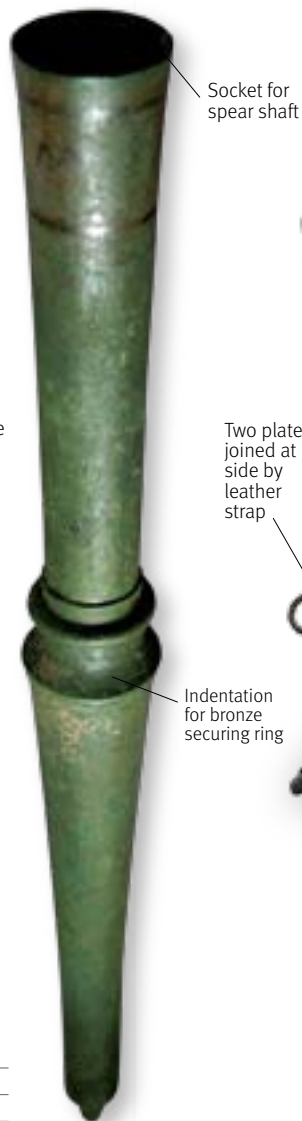
Made from bronze, this spear butt's main purpose was to act as a counterweight to the head at the other end of the spear, although if the spearhead broke off in battle, the butt could be used as a weapon. A thick bronze ring secured the butt to the spear.

Ridges to align with body muscles

DATE 4TH CENTURY CE

ORIGIN MACEDONIA

LENGTH 15 IN (38 CM)



Socket for spear shaft

Two plates joined at side by leather strap

Indentation for bronze securing ring

GREEK SPEARHEAD

The spear was the hoplite's principal weapon, his short iron sword only being used if his spear was broken during fighting. This spearhead is wide-bladed and made from iron, and the missing shaft would have been fashioned from strong wood such as ash.

DATE 6–5TH CENTURIES BCE

ORIGIN GREECE

LENGTH 12¼ IN (31 CM)



Open side areas most vulnerable sections

BRONZE CUIRASS

This muscled cuirass consists of a breast- and backplate joined together by hooks and straps. It would have been worn by a senior officer and would have been made to measure. The ordinary hoplite wore a more simple cuirass made either from bronze or from stiffened leather.

DATE 5TH CENTURY BCE

ORIGIN ITALY

LENGTH 19½ IN (50 CM)



Nasal
between
two eye
sights

Helmet made
from a single
piece of bronze

CORINTHIAN HELMET

An early example of perhaps the most famous Greek helmet, this Corinthian design follows the shape of the skull, and extends downward toward the shoulders and neck, leaving a narrow face opening with space for the eyes between a nasal.

DATE c.650 BCE
ORIGIN GREECE
WEIGHT 3½ LB (1.54 KG)



BRONZE GREAVES

The hoplite's large shield protected the lower abdomen and thighs, but to protect his knees and shins, he wore a pair of bronze greaves. The greaves shown here are sufficiently light and flexible that they could be "clipped on" over the soldier's calves without the need for leather straps.

DATE 6TH CENTURY BCE
ORIGIN GREECE
LENGTH 19 IN (48 CM)

Shaped to fit
leg muscles

Ridge
decoration

CORINTHIAN HELMET

The hoplite wearing his Corinthian helmet would have been a frightening sight to any opponent: a pair of glaring eyes behind stylized cutouts in the helmet face. A large horsehair crest was typically attached to the crown of the helmet to make the soldier look more impressive, as well as providing a means of identification in the thick of battle.

DATE 6–5TH CENTURIES BCE
ORIGIN GREECE
WEIGHT 3½–3¾ LB (1.5–1.75 KG)

Long
nosepiece

Cheek
guards



Almond-shaped
eye sights

CORINTHIAN HELMET

The Corinthian helmet provided good protection against all but the heaviest blows, but it was undeniably heavy, and it restricted sight and hearing while fighting. Toward the end of the 5th century, lighter designs became more popular.

DATE 6–5TH CENTURIES BCE
ORIGIN GREECE
WEIGHT 3½–3¾ LB (1.5–1.75 KG)

Long,
pronounced
cheek guards



ATTIC HELMET

Based on the Chalcidian helmet—which had evolved from the Corinthian—the Attic helmet provided better all-round vision and hearing, even if protection was reduced. Although named after the region around Athens, the Attic helmet proved most popular in the Greek city states in southern Italy.

DATE 5TH CENTURY BCE
ORIGIN GREECE
WEIGHT 3½–3¾ LB (1.5–1.75 KG)

Hinged cheek flaps could
be raised when out of battle

Ceremonial
or religious
figure





**CORINTHIAN
HAMMERED
BRONZE HELMET**

GREEK HOPLITE

FROM THE 7TH TO THE 4TH century BCE, the city states of Ancient Greece had citizen armies built around heavy infantry known as hoplites. Fighting at close quarters in tight formation, they proved more than a match for Persian invaders at Marathon and Plataea, and fought one another in the internecine Peloponnesian Wars. After the decline of the city states, Greek infantry served in the all-conquering army of Alexander the Great and as mercenaries fighting for Middle Eastern powers.

CITIZEN SOLDIERS

The hoplite of the city-state era was an amateur, part-time soldier. Military service was both a duty and a privilege of his status as a citizen of Athens, Sparta, or Thebes. The hoplite was obliged to present himself for service equipped with armor, shield, sword, and spear when the state required.

Only well-off citizens could afford the panoply of armor and other equipment, so hoplites were of necessity a social elite. They fought banded together in a tight formation known as a phalanx, while lightly armed infantry from the lower classes swarmed around their flanks armed with missile weapons. The best trained and disciplined of the city-state armies was that of Sparta. Its citizens were dedicated to military life from the age of seven and young men lived in barracks, away from their wives, to encourage male bonding. In general, though, as one would expect of a citizens' militia, hoplites were not rigorously trained. Physical fitness through competitive games was considered a better preparation for war than drill or strict discipline.

Their effectiveness as fighters was largely consequent upon the high morale of free men battling for their own city and for their reputation in the eyes of their fellow citizens. This gave them the resolve to prevail in face-to-face, close-quarters combat.

HOPLITE ARMOR

A fully armored hoplite wore a helmet, cuirass, and greaves, all made of bronze. Polished until it shone, armor provided an impressive visual display of status as well as practical protection.

Bronze helmet with cheek guards



Cuirass molding idealizes warrior's muscles



Two cuirass plates held together at sides with leather straps

Bronze greaves protect legs exposed below shield



HOPLITE AND CHARIOT

Chariots are frequently represented in Ancient Greek art, because they feature prominently in the story of the Trojan Wars as narrated in Homer's *Iliad*. By the city-state period, the Greeks no longer used chariots, although their enemies, the Persians, certainly did.

HOPLITES ENTERING BATTLE

As hoplites enter combat, the stabbing spear is wielded overarm while the large round shield is worn hooked over the left forearm. The need for greaves to protect the lower leg, exposed beneath the level of the shield, is evident. The horsehair crests on the helmets were probably for visual effect. Showing the hoplites without clothing aside from their armor is only an artistic convention.

GREAT WARRIORS

“GO NEAR, STRIKE WITH A LONG SPEAR OR A SWORD AT CLOSE RANGE, AND KILL A MAN. SET FOOT AGAINST FOOT, PRESS SHIELD AGAINST SHIELD, FLING CREST AGAINST CREST...”

SPARTAN POET TYRTAEUS, 7TH CENTURY BCE



TOOLS OF COMBAT



SPEARHEAD



SPEAR-BUTT SPIKE



CORINTHIAN HELMET

PHALANX FORMATION

Greek hoplites fought standing shoulder to shoulder in a phalanx, confronting the enemy with a wall of shields. Since each man's safety depended on his neighbor standing firm, it was a style of warfare in which group bonding was at a premium. When two phalanxes met, charging in opposite directions, there was a mighty clash of shield on shield. The hoplites stabbed with their spears and pushed with their shields until one of the formations broke and fled.



HOPLITE PHALANX

ANCIENT ROMAN WEAPONS AND ARMOR

THE ROMAN ARMY was the finest fighting machine of the Ancient World. Its troops were highly disciplined, well trained, and generally well led. The Roman legionary was also well equipped for whatever task was demanded of him. Archers and javelin-throwing light troops would disrupt the enemy, but the main battle was invariably fought by the heavy foot soldier: protected by a large rectangular shield, he fought in close formation to overwhelm the enemy with his short sword.

Holder for horsehair crest

Brow guard

Neck guard

GALLIC HELMET

Originating in the Roman province of Gaul, the Gallic helmet was used widely from 50 to 150 CE. Made from iron, this replica features a deep neck guard, a short brow guard to deflect sword and ax strokes away from the face, and broad cheek guards. The cheek guards are hinged to the side of the helmet, and then tied under the chin with straps or cords.

DATE 50–150 CE

ORIGIN GAUL/ITALY

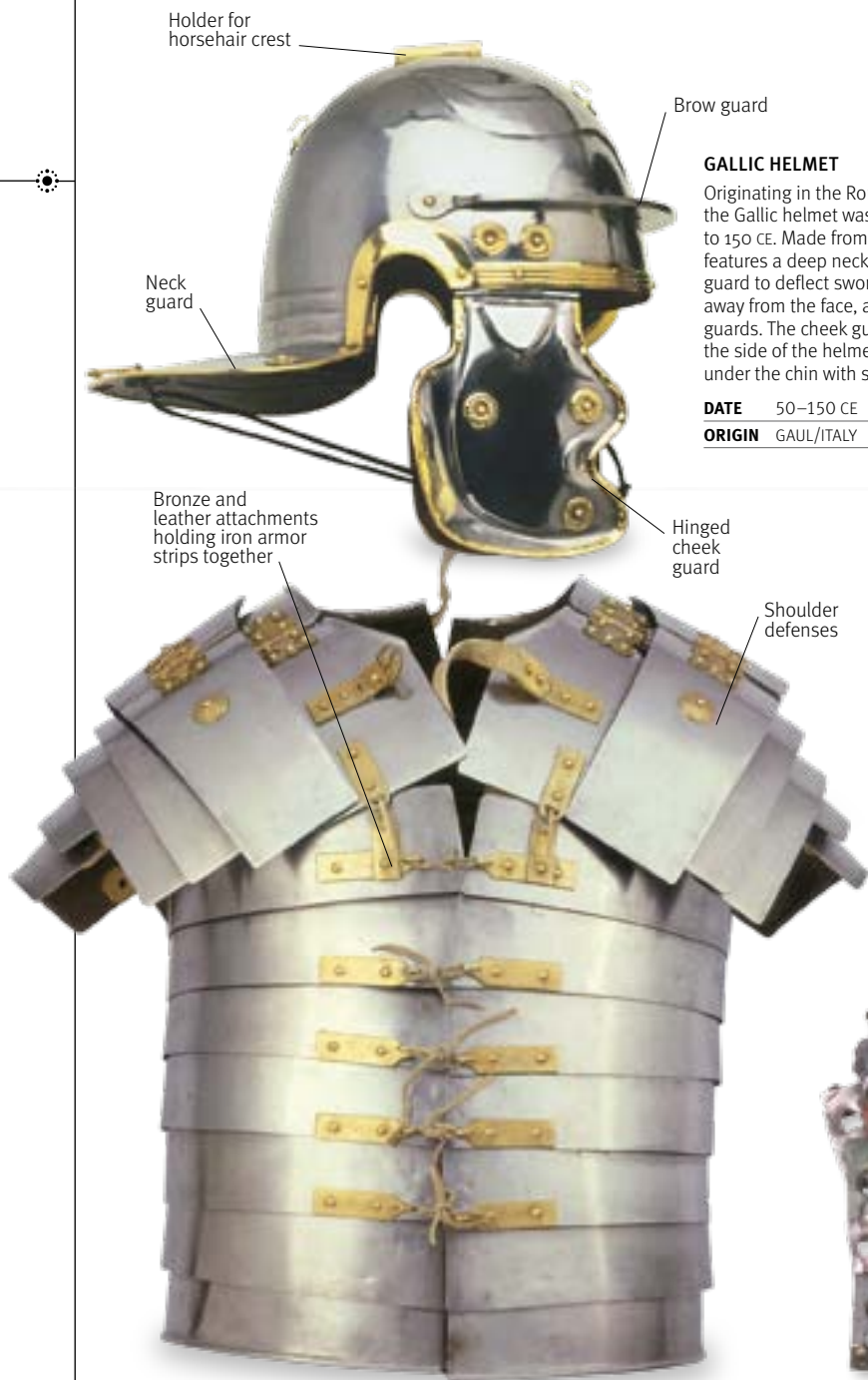
Bronze and leather attachments holding iron armor strips together

Hinged cheek guard

Shoulder defenses

Metal boss to provide extra protection for hand grip (on shield reverse)

Overlapping bronze scales



LORICA SEGMENTATA

Made of iron strips, this reproduction *lorica segmentata*—a combination of cuirass and shoulder defense—was worn from early in the 1st century CE to the 3rd century CE. This armor gave the Roman legionary a reasonable degree of protection and mobility.

DATE 1–3RD CENTURIES CE

ORIGIN ROMAN EMPIRE

LORICA SQUAMATA

Another type of cuirass was the squamata. This was made of overlapping bronze or iron scales attached to hide or strong cloth. The scales, joined to each other with metal wires, were usually positioned in horizontal rows.



SCUTUM

This is a replica of a rectangular infantry shield or *scutum*. The shield, made from laminated strips of wood, was covered with leather and then linen, the latter providing a surface upon which to paint legionary insignia. The shield was slightly curved to provide an element of all-round protection.

DATE REPLICA

LENGTH 44 IN (112 CM)

GLADIUS AND SCABBARD

While spears were important in softening up the enemy, the key Roman weapon was the short sword or *gladius*, which the legionary used to stab his opponent. Decorated in gold and silver, this magnificent ceremonial *gladius* was probably presented to a favored officer by the Emperor Tiberius.

DATE c.15 CE
ORIGIN ROME
LENGTH 22½ IN (57.5 CM)



Gold decoration showing Tiberius presenting his victories to stepfather Emperor Augustus

Portrait of the Emperor Tiberius

Legion's eagle standard in a shrine

Traces of wood from scabbard adhering to steel blade

Rusted and corroded steel sword blade

Long shaft made of ash

LANCEA AND PILUM

There are three main types of Roman spear: the heavy thrusting spear (*hasta*), the light thrusting spear (*lancea*), and the weighted javelin (*pilum*). This replica *pilum* has a long iron spearhead intended to pierce shields or armor; it was also designed to bend or break off on impact to prevent the enemy from throwing it back.

LANCEA



PILUM



Long iron point



Simple circular design

Horsehair crest

MONTEFORTINO HELMET

This replica helmet design dates back to 200 BCE, and was based on that used by the Romans' Celtic opponents. Like the similar Coolus helmet, it was made from bronze, and produced in vast numbers for Roman legionaries until the mid-1st century CE.

DATE 2ND BCE–1ST CE
ORIGIN ITALY



Holder for horsehair plume

Long cheek guards

Deep neck guard

GALLIC HELMET

This replica Roman Gallic-style helmet proved effective for the Roman Army: it provided good protection for the head and shoulders and allowed the legionary good visibility and the ability to hear commands.

DATE 2ND BCE–1ST CE
ORIGIN ITALY



Scenes of gladiatorial combat

Shallow visor

Protective grates over eyes

Full face protection

GLADIATOR'S HELMET

The *provocator* (or challenger) gladiator was equipped with a helmet based on the Roman legionary's Gallic pattern, but with the addition of a full-face visor with two round eye holes covered with protective grates.

DATE 1ST BCE–3RD CE
ORIGIN ROME



ROMAN
INFANTRY
SHIELD

ROMAN LEGIONARY

THE ROMAN ARMY of the 1st century CE held together an empire stretching from Britain to North Africa, and from Spain to the Middle East. The majority of the soldiers of the Roman legions were armored infantry. Stationed in fortresses, forts, and camps around the empire, the legionaries acted as police, administrators, construction workers, and engineers, and carried out duties that ranged from patrols to full-scale wars.

PROFESSIONAL SOLDIERS

The Roman legionary was a professional soldier engaged for 20 years active service plus five years lighter duties as a “veteran.” Legionaries were recruited from Roman citizens, mostly volunteers from the poorer classes. They were organized into centuries of 80 men, led by a centurion. Six centuries made a cohort and ten cohorts a legion. The system encouraged group loyalty at every level.

Rigorous training and daily drill made the legionary a disciplined, hardened fighting man. He was trained to march 20 miles (322 km) in five hours and to fight with absolute ruthlessness. Drawn up for battle, legionaries waited until the enemy was almost upon them before throwing their *pilum* (spear), then attacking with the *gladius* (short sword). Punishments for lapses of discipline were brutal—a man who slept on guard was clubbed to death by his colleagues. On retirement, the legionary received a plot of land or a lump-sum payment in recognition of his service.

HADRIAN'S WALL

Roman legionaries could be classified as combat engineers, for construction work was as much a part of their duties as fighting. Hadrian's Wall, which stretches across 73 miles (118 km) of northern England, was built by legionaries in the early 2nd century. Marking the northern limit of the Empire, the wall and its forts were manned by the legions for over 250 years.



EXCAVATED VINDOLANDA FORT
RUINS AT HADRIAN'S WALL

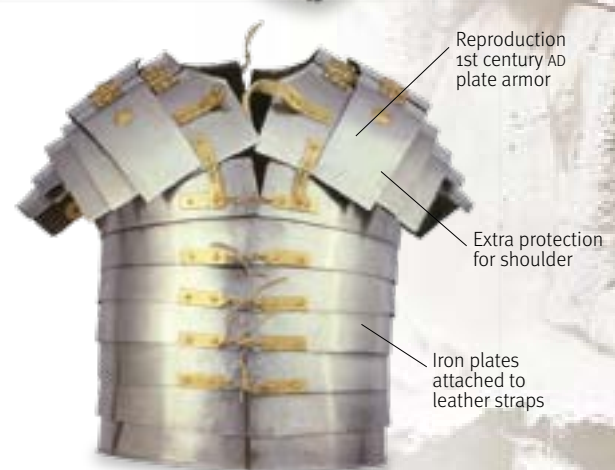
TRAJAN'S COLUMN

In a scene from the Dacian Wars (101–106 AD), as depicted on Trajan's Column in Rome, Roman soldiers fight back against a Dacian assault on the walls of their fort, while a column of legionaries with a mounted officer arrives to rescue them. Erected to commemorate the emperor Trajan's campaigns, the column provides a visual record of Roman military life.



LEGIONARY DRESS

When the Roman Empire was at its height, legionaries wore simple bronze helmets and segmented armor (*lorica segmentata*). Under the armor, they had a belted tunic and, on their feet, sturdy metal-studded sandals. The ability of the Roman state to equip all its soldiers with armor and helmets contrasted with the Empire's “barbarian” enemies.



“THE ROMANS INSTILL INTO THEIR SOLDIERS FORTITUDE, NOT ONLY OF BODY, BUT ALSO OF SOUL.”

ROMAN AUXILIARIES

Two Roman auxiliaries offer the severed heads of their enemies to the emperor, behind the backs of a rank of legionaries. Whereas all legionaries were Roman citizens, the auxiliaries were non-citizens. They can be distinguished by their oval shields and mail body armor. The auxiliary legions had lower status but were often made to bear the brunt of the fighting.

GREAT WARRIORS

TOOLS OF COMBAT



ORIGINAL SCABBARD



GLADIUS: SHORT SWORD



SWORD BLADE



HASTA AND PILUM: THROWING SPEARS



GLADIUS SCABBARD



BRONZE- AND IRON-AGE WEAPONS AND ARMOR

THE CELTS WERE great warriors: in 390 BCE they crushed the army of the Roman Republic and sacked Rome itself. They were known as swordsmen, heavy infantry who repeatedly charged their enemies. Most fought on foot with little armor other than a helmet and shield. The nobles fought from horseback or, particularly in Britain, chariots. The Celts are famed for their decorative and metalworking skills.

Horns were often symbols of gods in the Ancient World

BRONZE HELMET

The only horned Iron-Age helmet to be found in Europe, this piece is made from bronze sheets riveted together. Dredged from the Thames River in London, it is almost certainly a parade helmet, not being strong enough to wear in battle.

DATE 250–50 BCE

ORIGIN BRITAIN

HEIGHT 9.5 IN (24 CM)

Carefully worked bronze rivets

Celtic La Tène-style decoration

Estimated to fit head size 22½ in (56 cm)

The edges were hammered repeatedly

Originally highly polished and shiny

One-piece casting

Wood, bone, or horn plates

Decorative bronze metalwork on hilt

Iron blade

CELTIC DAGGER

The breathtaking art of the Celts is displayed on the hilt of this dagger. As with so many pieces of arms and armor that have survived, it has probably done so because it was used for funerary or display purposes. Knives and daggers were working tools, but this is so beautiful and intricate that it may not have been designed for everyday use.

DATE UNKNOWN

ORIGIN BRITAIN

BRONZE LEAF-SHAPED SWORD

Until iron working started around 600 BCE, bronze dominated weapon manufacture. This leaf-shaped sword is typical in size and shape of Bronze-Age swords, with a double-edged blade. Bronze is hard to sharpen and keep sharp, so this blade represents significant metalworking skills.

DATE c.1000 BCE

ORIGIN BRITAIN

LENGTH 22¾ IN (57.9 CM)

GERMANIC BRONZE SWORD

Bronze-Age one-piece, leaf-shaped swords were designed for slashing and were often more effective than a spear or longer thrusting sword. This suited the method of fighting the Celts preferred.

DATE 1000 BCE

ORIGIN GERMANY

LENGTH 25¾ IN (66.5 CM)

Engraved ornamentation on pommel

Hilt originally wrapped in leather

Extended unsharpened ricasso



Long steel cutting edge

Shaft wedged tight rather than tied

BROAD-BLADED BATTLE AX

The head of this ax has been hammered from one iron bar. A long wooden handle was wedged tightly into the socket to make an effective weapon for hand-to-hand combat.

DATE UNKNOWN

ORIGIN NORTHERN EUROPE



Bronze does not hold edge well

Socket is hollowed-out

BRONZE AXHEAD

Bronze battle axes, with sockets to take a wooden shaft, are associated with the Celts from the earliest times. They were used as tools but they were also useful in hand-to-hand combat. They would become more effective when made from iron.

DATE 750–650 BCE

ORIGIN UNKNOWN



Decorated guard

Wooden sheath with bronze strips

Holes for cross-straps

IRON-AGE DAGGER IN SHEATH

This decorated iron dagger in its bronze sheath would have belonged to a tribal chief. Iron blades showed status in this period, and were also used for everyday functions, but only in extreme circumstances in battles fought with swords or spears.

DATE 550–450 BCE

ORIGIN BRITAIN



Leaf-shaped head

BRONZE SPEARHEAD

Spears and javelins played an important role in Celtic battle tactics. Charging the enemy, the infantry would hurl their javelins from about 90 ft (30 m) hoping to break up the ranks ahead for single combat. Spears were used as thrusting weapons, by infantry and cavalry.

DATE 900–800 BCE

ORIGIN UNKNOWN

LENGTH 20 IN (50 CM)

THE BATTERSEA SHIELD

Pulled from the Thames River at Battersea Bridge in London in 1857, this is the decorative bronze cover to a wooden shield. Almost certainly a parade shield, it seems too finely wrought to have been used in combat. Celtic shields were circular at first, but during the Iron Age period, they adopted the longer, full-body shield.

DATE 350–50 BCE

ORIGIN BRITAIN

LENGTH 30½ IN (77.7 CM)



FULL VIEW

La Tène-style decoration

Boss protects hollowed-out handhold on the reverse

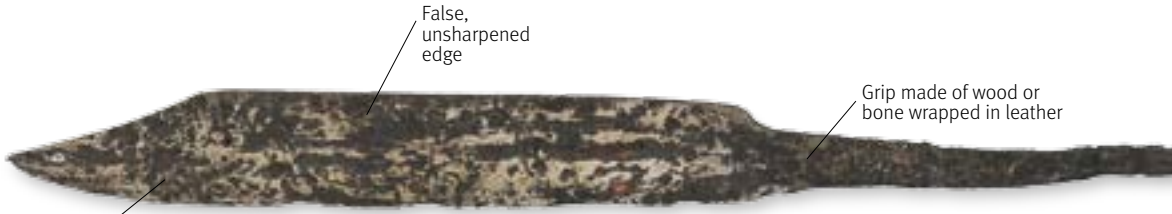


Shield has 27 studs of red glass



ANGLO-SAXON AND FRANKISH WEAPONS AND ARMOR

THE MASS OF ANGLO-SAXON and Frankish warriors were infantryman, who carried a shield and a dagger (a *seax*), often wore a helmet, and fought with spears, axes, and the single-bladed heavy weapon called variously the *scamasax*, *scramasax*, or long *seax*. The nobility and their retinues of professional soldiers had more sophisticated armor and weaponry: chain mail; *spangenhelm* helmets with neck and face protection; *angons* (throwing spears similar to the Roman *pilum*); and, of course, swords.



Blades are always single-edged

False, unsharpened edge

Grip made of wood or bone wrapped in leather

BLADE OF A SEAX

Swords were extremely expensive weapons, so most people carried a blade that doubled as a fighting dagger and a working tool. Called the *sax* or *seax* (the root of the name “Saxon”), examples have been found from the 5th century onward.

DATE	900–1000 CE
ORIGIN	NORTHERN EUROPE
WEIGHT	2 OZ (0.06 KG)
LENGTH	9¾ IN (24.76 CM)



Tough single-edged blade

SCAMASAX

The *scamasax* or *scramasax* is a long *seax*—the length of a sword—with a lower, curved, sharpened edge, and no pommel. Crude, easier to manufacture than a sword, and more like machetes, they were effective weapons that would see service until the 15th century, providing those who could not afford a sword with a long blade.

DATE	900–1000 CE
ORIGIN	NORTHERN EUROPE
WEIGHT	2 OZ (0.06 KG)
LENGTH	7½ IN (19 CM)

Long grip for wielding with both hands



SHORT SAXON SPEAR

The main weapon of this period was the spear, carried equally by a lord, his retinue, professional fighters, and the mass of troops. There were two types, those used for hand-to-hand combat and those thrown before contact with the enemy, which tend to be lighter and, in the case of the Frankish *angon*, much like the Roman *pilum*.

DATE	400–500 CE
ORIGIN	NORTHERN EUROPE
LENGTH	8½ IN (21.5 CM)

Socket hammered tight to shaft and riveted

Leaf-shaped spearhead



Long spears were used by, or against, cavalry



Grip made of wood or bone covered with leather

Typical, slightly tapering, double-edged blade





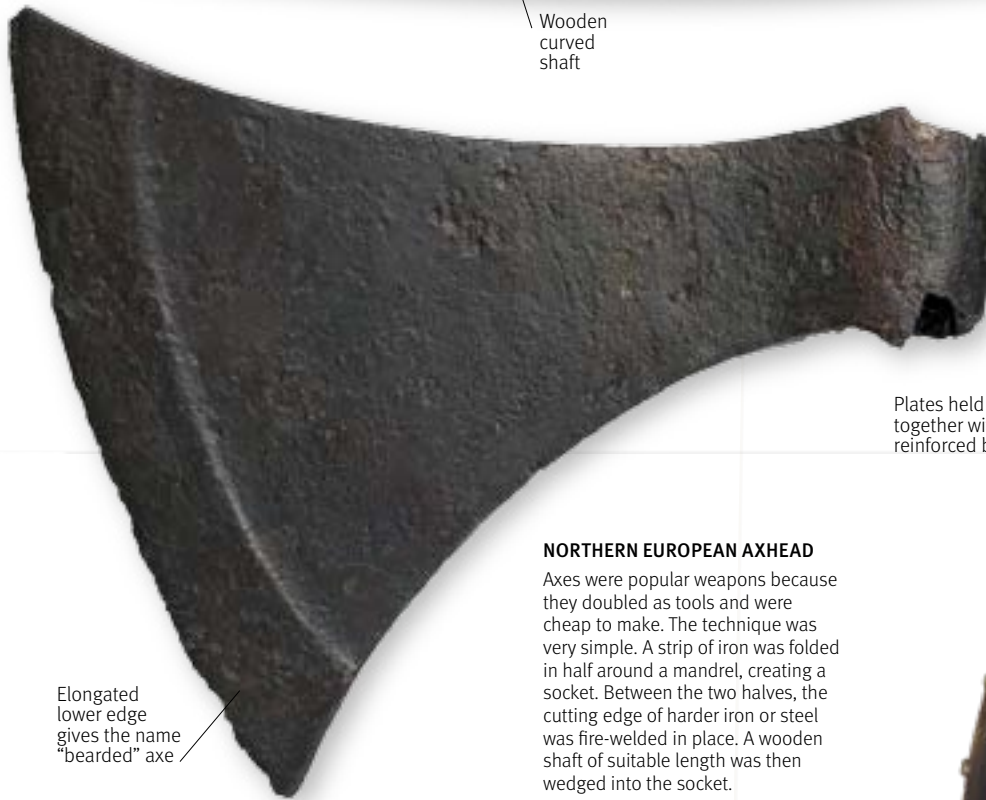
Wooden curved shaft

Iron head angled from the shaft

FRANCISCA THROWING AX

The throwing ax was popular with the Germanic warriors who fought against Rome in its later years. It was used in a similar way to the javelin—thrown before contact with the enemy to create gaps in their battle lines.

DATE	400–500 CE
ORIGIN	EUROPE
WEIGHT	15 OZ (0.43 KG)
LENGTH	6¼ IN (16.5 CM)



Elongated lower edge gives the name "bearded" axe

NORTHERN EUROPEAN AXHEAD

Axes were popular weapons because they doubled as tools and were cheap to make. The technique was very simple. A strip of iron was folded in half around a mandrel, creating a socket. Between the two halves, the cutting edge of harder iron or steel was fire-welded in place. A wooden shaft of suitable length was then wedged into the socket.

DATE	900–1000 CE
ORIGIN	NORTHERN EUROPE
WEIGHT	17½ OZ (0.50 KG)
LENGTH	8¾ IN (22 CM)

Plates held together with reinforced bands



FRANKISH SPANGENHELM

As with mail and armor, helmets were taken from the dead on the battlefield and are rarely found in burials. However, a sufficient number of these *spangenhelm* survived. The style originated in the Middle East and spread to Western Europe by the 3rd century CE.

DATE	500–600 CE
ORIGIN	WESTERN EUROPE

Cheek guard

LONG SAXON SPEAR

The use of spears is portrayed in the Anglo-Saxon poem about the Battle of Maldon in 991 CE. Eorl Byrhtnoth throws two javelins, killing two men, before he himself is wounded by a thrown Viking spear. Only then does he draw his sword. Thrusting spears were longer, with larger heads such as this example, attached to the shaft with a split socket and rivet.



Long head



Tip less sharp than many seaxes or scamasaxes

SAXON SWORD

Swords were expensive and time-consuming to manufacture by pattern welding. They were only used in Saxon society by people of high rank or professional warriors, and were objects of great veneration.

DATE	500–600 CE
ORIGIN	NORTHERN EUROPE

3000 BCE—1000 CE

◀ 50–51 ANGLO-SAXON AND FRANKISH WEAPONS AND ARMOR

VIKING WEAPONS AND ARMOR

MAIL SHIRT WITH DAGGED POINTS

Initially worn only by the rich and powerful, mail shirts, called *brynja* or *hringserle*, became more common in the 11th and 12th centuries.

DATE 900–1000 CE

ORIGIN UNKNOWN



Rings were riveted, flame-welded, or with overlapping unriveted ends

Early mail was jerkin (thigh) length but later mid-calf

Hardened iron or steel to carry a better edge

Bound around edge with leather or iron

THE SEAFARING SCANDINAVIANS known as Norsemen or Vikings have a special place in European history. From the British Isles to the Varangian Guard in Kievan Rus, they came to symbolize the quintessential Dark-Age warrior. Striking from the sea in their longboats, they plundered the coasts of Europe before colonizing and settling possibly as far afield as Nova Scotia. They were well armed, in particular with swords and axes, but also with spears, javelins, and bows. They carried round shields and most wore helmets; many wore mail as well.

IRON AXHEAD

This ax has a convex blade with a hardened edge welded on separately, and a flattened ovoid socket. It would have had a wooden handle.

DATE 900–1000 CE

ORIGIN NORTHERN EUROPE

WEIGHT 17½ OZ (0.50KG)

LENGTH 8¾ IN (22 CM)



Blade curves downward and inward

Decoration continues over socket

Brightly painted, often with crosses once Christianity was adopted

Projections around socket stop axhead from shearing



FULL VIEW



PAINTED WOODEN SHIELD

The shield was an important part of the Viking's battlefield armory. Made from wood, they were covered in leather. This example is a replica.

DATE 900–1000 CE

ORIGIN NORTHERN EUROPE

WEIGHT UNKNOWN

DIAMETER 30–40 IN (70–100 CM)

Shaped plates make up dome



Animal decoration

Nasal offers nose protection

SWEDISH HELMET

Discovered in a grave at Vendel in Sweden, this conical helmet is similar to the Gjermundbu find with its spectacle visor. Most Viking warriors possessed helmets, but few would have been as ornate as this.

DATE 800–900 CE
ORIGIN SWEDEN

Silver wire ornamentation



ENGRAVED IRON AXHEAD

This beautifully decorated axhead was found in Mammen in Jutland, and is the name for this style of ornamentation.

DATE c.970 CE
ORIGIN DENMARK
LENGTH 6½ IN (16.5 CM)

Broad, crescent-shaped blade



Cutting edge made of hardened steel

IRON AX

This is one of three forms of Viking ax, the bearded ax whose elongated lower edge and slanting blade favored downward blows.

DATE c.900 CE
ORIGIN UNKNOWN

Long handle to allow two-handed blow



Dome composed of four plates

Spectacle visor protects eyes and nose

METAL-PLATED HELMET

This is a reconstruction of a helmet from fragments found in a grave at Gjermundbu. It is made up of a dome of four plates fixed to a brow band by two bars that crisscross the head.

DATE c.875 CE
ORIGIN NORWAY

Dome strengthened by keel rib



Decorated nasal guard

WENCESLAS HELM

Named after the helmet from the Treasury of Prague Cathedral, the Wenceslas style is characterized by its one-piece forging with added brow band and nasal guard, which are silvered and highly decorated.

DATE c.900 CE
ORIGIN CZECHOSLOVAKIA

Dome strengthened by keel rib



Spectacle visor to protect face

GJERMUNDBU-STYLE HELMET

Another Gjermundbu-style helmet, this has a spectacle guard riveted to a brow band and two strengthening bands to hold together the four plates that make up the dome.

DATE c.900 CE
ORIGIN NORWAY

VIKING WEAPONS AND ARMOR



FULL VIEW



Guard formed of large boat-shaped plate

Two-edged pattern-welded blade

8TH–9TH CENTURY VIKING SWORD

This iron sword is typical of Viking weapons, being straight-sided and about 35½ in (90 cm) long. It has a two-piece pommel and guard, both of which are decorated with an interlace pattern in brass inlay. The blade is inlaid in iron on one face with a figure-of-eight mark.

DATE 900–1000

ORIGIN UNKNOWN

LENGTH 35½ IN (90 CM)



Straight guard

Typical iron double-edged blade

Large decorated pommel

DOUBLE-EDGED SWORD

There were many variations in Viking swords, mainly in the form of the pommel, guard, and hilt. Most blades were double-edged with a rounded tip because they were used for big, slashing blows delivered to miss a shield or defensive parry, which could severely damage the blade.

DATE 800–1100

ORIGIN DENMARK

LENGTH 90CM (35½IN)



Hilt decorated with geometric patterns of silver and brass

Rounded pommel

Pattern-welded blade

EMBELLISHED DOUBLE-EDGED SWORD

Many Viking swords such as this one were pattern-welded for extra strength. This ancient process involves introducing carbon into the red-hot iron and making a number of rods. These are twisted and forged together with rods containing less carbon, producing a patterned appearance.

DATE 700–800

ORIGIN DENMARK

LENGTH 35½ IN (90 CM)

LATE VIKING SWORD

This broad, straight, two-edged blade retains traces of an inlaid inscription, now indecipherable, and a scroll-design pommel; the grip is missing. The sword is more tapered than earlier versions.

DATE 900–1150

ORIGIN SCANDINAVIA

LENGTH 35½ IN (90 CM)



VIKING SWORD BLADE

This later Viking sword blade is much corroded, as are so many found on archaeological sites. Their wooden scabbards and hilts have almost always completely rotted away, making interpretation of runic inscriptions very difficult.

DATE 900–1000

ORIGIN UNKNOWN

LENGTH 80–100CM (c.31–39IN)



Hilt arrangement



Blade strengthened by rib

Longer blade used for thrusting

LOZENGE-SHAPED SPEARHEAD

Throwing spears were important Viking weapons, and their use is recorded in the sagas, including stories of those who could throw two at once. Olaf Trygvasson was said to be able to do this from each hand at the same time.

DATE 600–1000
ORIGIN NORTHERN EUROPE
LENGTH 14¼ IN (36.6 CM)

WINGED SPEARHEAD

This lugged or “winged” spearhead, of a type used for war and hunting, has a corroded iron head, leaf-shaped blade of flattened diamond-section—now curved out of true by heat or burial—and a tapered iron socket. The wings can catch and lock an opponent’s weapon in hand-to-hand combat, stop a blade from sliding down the spear toward the user’s hands, and can hook a shield out of the way.

DATE 700–800
ORIGIN NORTHERN EUROPE
LENGTH 18 IN (47 CM)

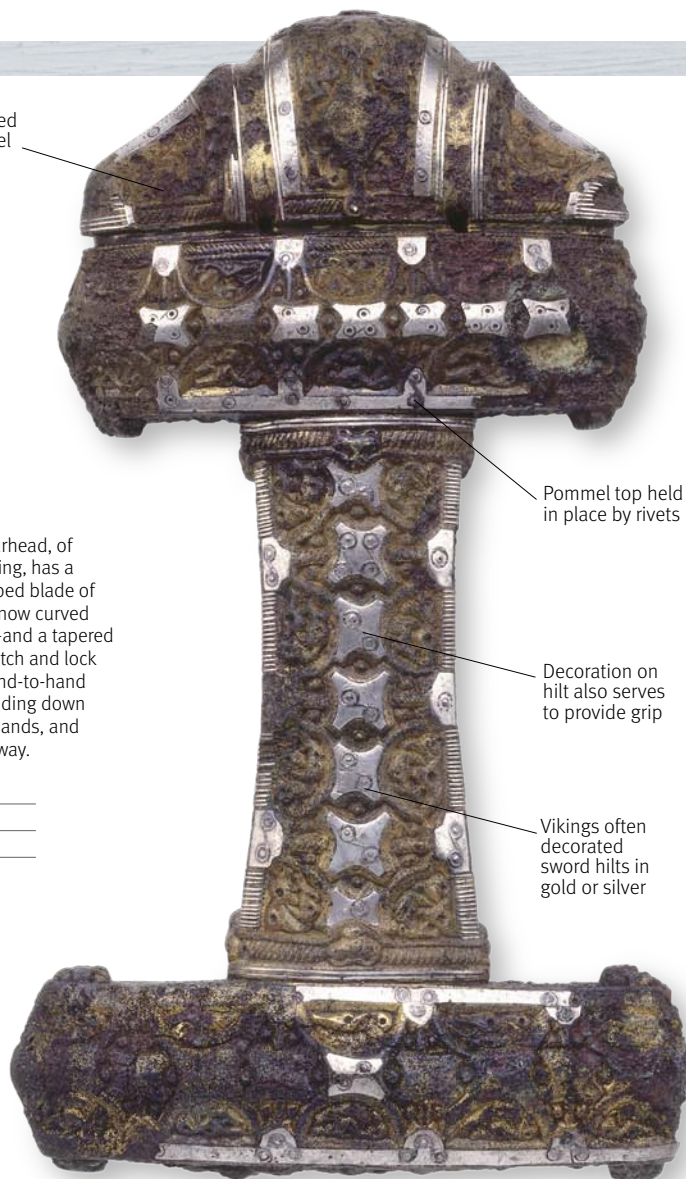
Many thrusting spears have wings on either side

Rounded pommel

Pommel top held in place by rivets

Decoration on hilt also serves to provide grip

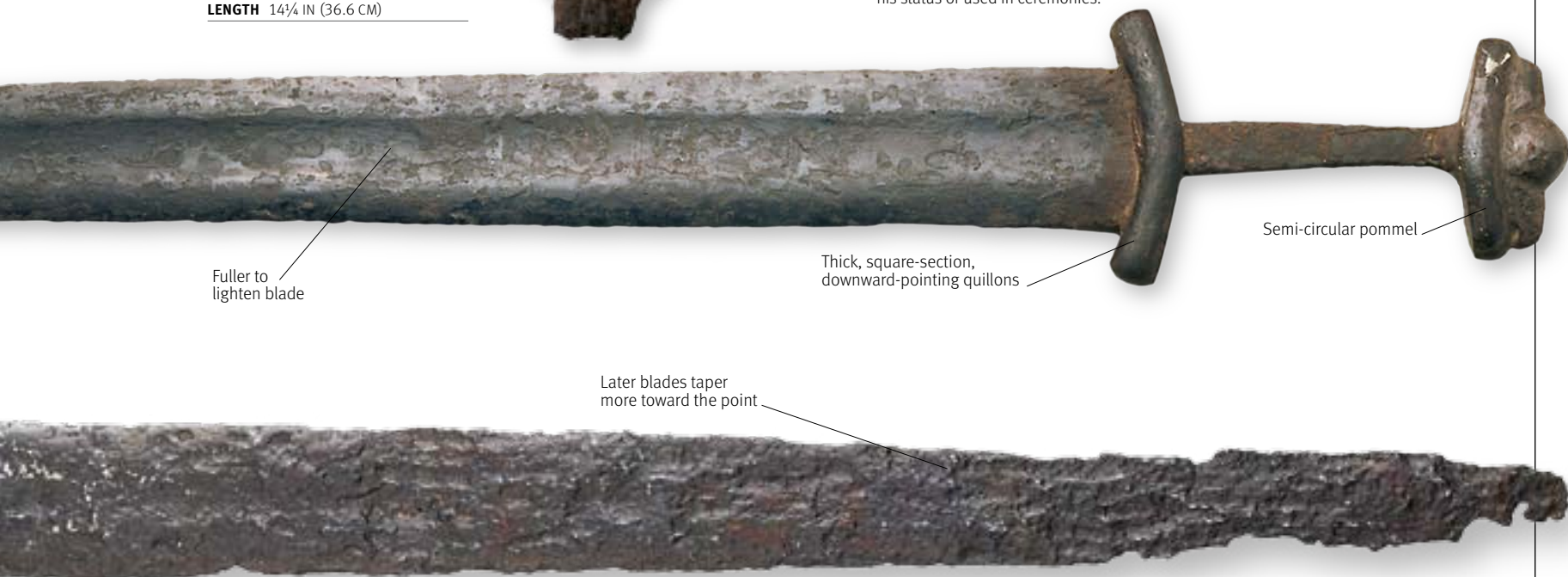
Vikings often decorated sword hilts in gold or silver



VIKING SWORD HILT

This sword hilt has a characteristic Viking rounded pommel – it is probably made from copper and decorated with inlaid geometric designs in silver. The sword is too finely crafted to have been used in battle and would have been carried by a chieftain to show his status or used in ceremonies.

DATE c.700–1050
ORIGIN NORTHERN EUROPE

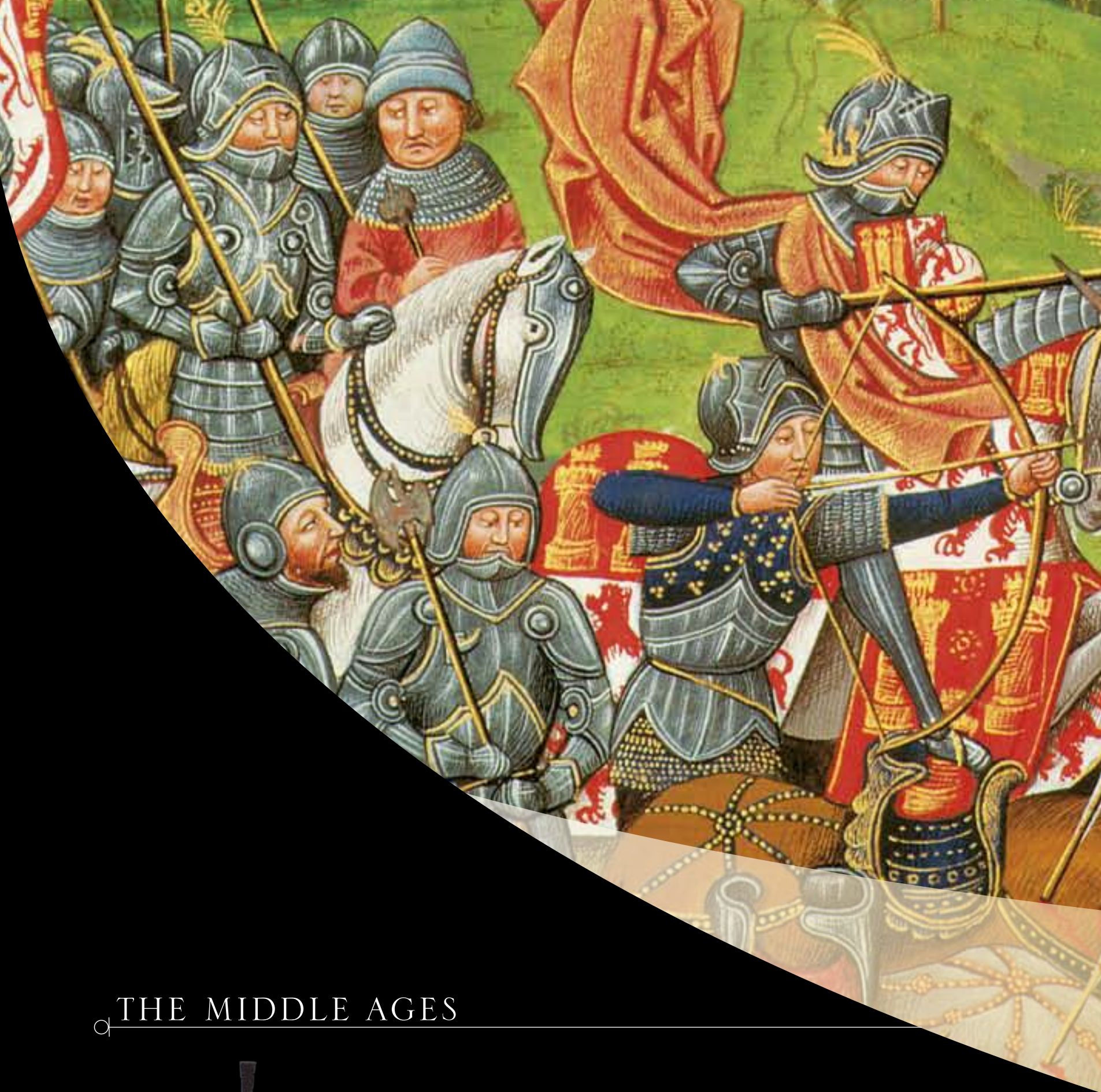


Fuller to lighten blade

Thick, square-section, downward-pointing quillons

Semi-circular pommel

Later blades taper more toward the point



THE MIDDLE AGES





Many of the weapons, tactics, and forms of social organization popularly held to be characteristic of the Middle Ages had, in fact, been prefigured in late antiquity. Heavy cavalry, the holding of land in exchange for military service, religious warfare, and the struggle of urban cultures against incursions by mounted nomads were themselves new phenomena. What altered at the end of the medieval period was the growth in the capacity of states to maintain a centralized administration and the appearance of gunpowder weapons—powerful indicators of changes to come.



FROM 955 CE, when the heavy cavalry of Otto I of Germany crushed the lighter mounted Magyars at the Battle of Lechfeld, Europe experienced a period of comparative peace. Yet, it was also a time of political fragmentation, as, most notably in France and Germany, the centralized kingdoms of the 9th century gave way to a constellation of smaller states often no larger or more enduring than the ability of a local warlord to enforce his will. As the capacity of royal courts to organize large armed bodies declined, a system of feudalism arose to fill the breach (see box page 60).

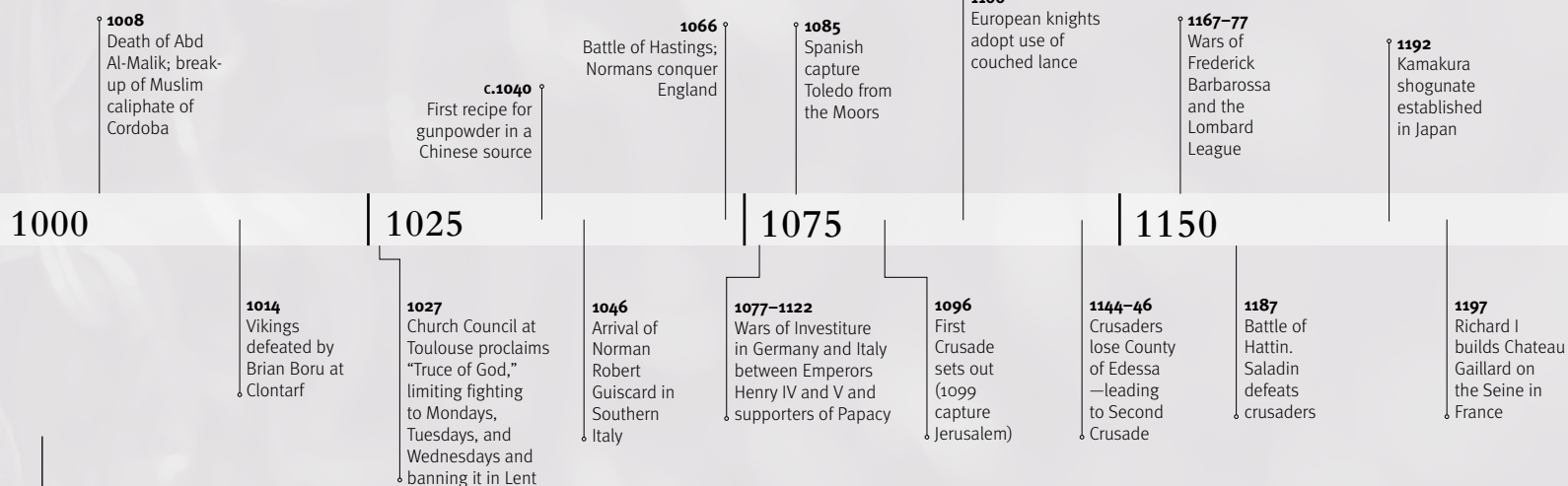
THE EMERGENCE OF MOUNTED ARMIES

The core of feudal armies was formed by mounted men-at-arms—not all of them knights. The ability to fight on horseback—as opposed to merely arriving by horse on the battlefield or engaging with the enemy at bow-shot distance—had been hugely enhanced in the 8th century with the arrival in Europe of the stirrup, which gave a mounted warrior a much more stable platform from which to employ swords or spears. The characteristic dress of such 11th- and 12th-century fighters is summed up in the 1181 Assize of Arms of Henry II of England, which declared “let every holder of a knight’s fee have a hauberk [coat of mail], a helmet, a shield and a lance.”

Such armies were expensive to maintain and inflexible, and as the obligatory period of service was so short, campaigns could not be long. This, and the need to avoid casualties among the hard-to-replace heavy cavalry, meant that the raid or *chevauchée* came to be the standard form of warfare. Pitched battles were relatively rare, although those large-scale battles that did occur, such as the defeat of the

NORMAN ATTACK

William of Normandy’s mail-clad army assault the Breton town of Dinan, defended by a motte-and-bailey fortification, in the style the Normans would import into England.



English king Harold II by the Norman Duke William at Hastings in 1066, were all the more decisive for it.

William's army is depicted on the Bayeux Tapestry clothed in mail and sporting conical helmets. A large portion of the Norman army was, in fact, composed of archers, with shortbows or mechanical crossbows. At Hastings, massed volleys of arrows, combined with hit-and-run cavalry attacks, overcame the English shield wall manned by Harold's *huscarls*, warriors of undoubted effectiveness wielding two-headed axes, but who lacked the mobility to counter the Norman tactics.

CASTLE BUILDING

The establishment of Norman rule across England was accompanied by a program of castle building. The rapid spread of such fortifications controlled by local magnates, rather than the royal courts, became a defining feature of the political landscape of western Europe. In England, these were at first of the motte-and-bailey type with a fortified wooden tower constructed on an earth mound. By the 13th century, they had become more sophisticated affairs of stone, with concentric rings of defenses and rounded towers to guard against undermining. Castles such as Harlech in Wales or Chateau Gaillard in France could be defended by relatively small numbers of trained troops and, if well provisioned, withstand quite extensive sieges. Wars came to center on the reduction of such strongholds by storming, diplomacy, or—most often—by waiting for hunger or disease to strike down the defenders; in 1138 King David of Scotland captured Wark Castle by allowing the garrison to go free and even providing them with horses to replace their own, which they had been forced to eat.

THE CRUSADES

Further refinements in military architecture, such as the use of castellation, were imported from the Middle East during the time of the Crusades. The Muslim armies of the



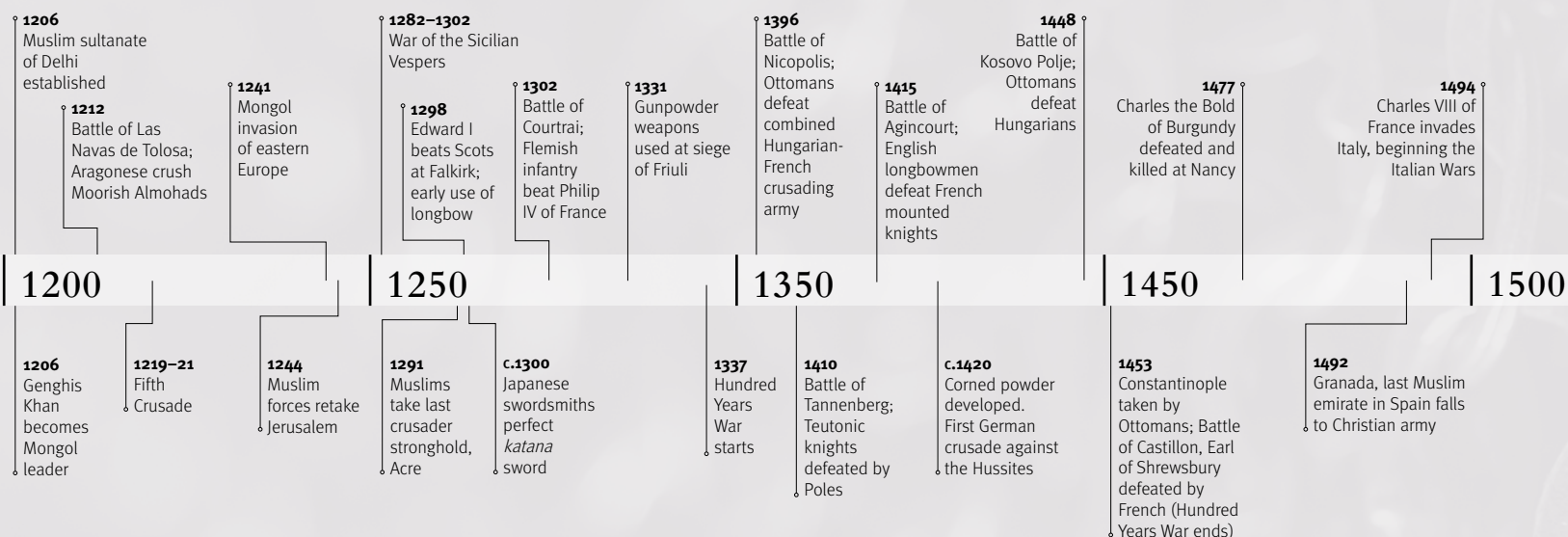
Levant were composed mostly of lightly armed mounted archers, who used their maneuverability and elusiveness to deft effect in wearing down and picking off the more cumbersome Crusader knights. Western armor had by this time become heavier, with the mail coat reaching down to the knee, and long kite-shaped shields intended to provide maximum protection on horseback. Armed with couched lances, a massed charge by the crusader knights, as at Arsuf in 1191, could be devastating, but equally, as when Saladin wore down the Christian army through heat and thirst at Hattin in 1187, such a heavily armored force could rapidly become ineffective if denied supply and shelter.

One solution to over-reliance on an expensive and inflexible mounted arm was to increase the role of footsoldiers. In truth, knights often did fight on foot—at Dorylaeum in 1097 during the First Crusade, one half of

MONGOL WARRIORS

Genghis Khan's Mongol cavalry were almost unstoppable on open terrain, even against other mounted opponents such as the Tartars.

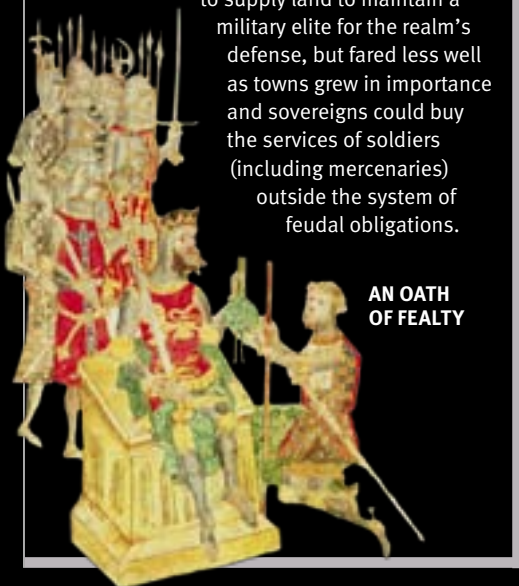
the crusading army dismounted and fought as infantry. But states came increasingly to rely on pure footsoldiers, first in a supporting role, and then as a principal element in their armies. This was particularly marked from the 13th century as the economic power of towns grew and their capacity to provide soldiers burgeoned. In 1340, Bruges was able to raise 7,000 men from its population of 35,000. Armed with weapons such as polearms, which required less training than the equipage of a knight, the later medieval infantry relied on solidarity and massed formations, very much in the spirit of the Macedonian phalanx.



FEUDALISM

“Feudalism” is a modern term to describe the complex system of land tenure and military obligation that characterized medieval Europe. In its classic form, feudalism meant that each man had an overlord (or liege) and provided him with services—most often military—in exchange for the holding of land (the fief). It was ideally adapted to a situation where rulers needed

to supply land to maintain a military elite for the realm’s defense, but fared less well as towns grew in importance and sovereigns could buy the services of soldiers (including mercenaries) outside the system of feudal obligations.



AN OATH OF FEALTY

A defining moment came in 1302 at Courtrai, when a force of Flemish burghers, armed with pikes and spears, routed an army of French knights as it stumbled through a muddy, broken terrain of ditches and trench traps.

THE CROSSBOW AND THE LONGBOW

The infantry did not rely solely on static defensive weapons such as pikes, or close-quarter bludgeons such as clubs. An increase in the effectiveness of missile technology brought crossbows and, most particularly, longbows to prominence on the battlefield. The crossbow was already well-established in Europe by 1139 when the Lateran Council sought—in vain—to ban its use against Christians because of the terrible wounds it inflicted. The crossbow bolt’s penetrative power and the fact that to use it required little expertise, meant its use became extremely widespread. The English, however, favored the longbow, which required great strength—both in its construction and from the archer—but whose rate of fire was roughly four times that of a crossbow. Although first used to real effect at Falkirk against the Scots in 1297, the longbowmen played a key role during the Hundred Years War in defeating the French at Poitiers in 1356 and Agincourt in 1415. In both cases, however, the French army also fell victim to a persistent tendency to

favor the heavy cavalry charge, even when the terrain slowed and channeled their progress to make them especially vulnerable to arrow-fire.

One response to this weakness was to increase the protective capacity of the knight’s armor yet further. In the 14th century, open helmets were replaced with closed “great helmets” and the following century saw the gradual introduction of full plate armor, which became increasingly elaborate and beautifully worked. Although fluting of the metal and the molding of the pieces to the physique of the wearer meant they were not as impossibly heavy as they seemed, such suits of armor were almost luxury items, affordable only by the aristocracy. While they might protect and mark out commanders, they were a further indication that armies composed largely of mounted knights were on the verge of obsolescence.

THE MONGOLS

In the mid-13th century, another group of light cavalry again showed the power of massed horse archers. The Mongols emerged from central Asia, overwhelming first northern China—which they took in 1234—then Persia and the Muslim states of the Levant, before sweeping down on Russia and eastern Europe in the 1240s. Relying on light,



COURTRAI CHEST

A scene from the Battle of Courtrai (1302), where Flemish communal infantry held firm against a French cavalry charge. It became known as the “Battle of the Golden Spurs” due to the number of spurs collected from the defeated French knights on the field.



CHINESE MACE

This mace, with a strap to secure it to the bearer’s arm, is typical of the weaponry carried by the Mongols during their rule over China (1279–1368)

mounted bowmen who could travel long distances rapidly, even in adverse conditions, the Mongols were able to bring opponents to battle on their own terms. They employed tactics of surprise and terror to such effect that many towns simply surrendered to them rather than risk the wholesale slaughter of their citizenry. In April 1241, within a few days, they simply crushed two European armies of Poles and Hungarians that dared to face them. Only the capricious nature of the Mongol dynastic succession saved western Europe from utter devastation.

EARLY FIREARMS

During their Chinese campaigns, the Mongols would, for the first time, have faced a new type of weaponry—firearms. The earliest recipe for gunpowder comes from the *Wujing Zongjiao* (c.1040), while the Chinese may have used “fire-lances” against the nomadic Jurchen in 1132. The Mongols themselves used primitive gunpowder weapons in their abortive invasions of Japan in 1274 and 1281, but it was their successors, the Ming, who first exploited them, justifying the name by which

gunpowder came to be known in Europe—“Chinese salt.” The Ming, indeed, had a military school by the early 1400s specifically tasked with instructing soldiers in the use of firearms, and also employed dragoons—mounted handgunners.

Although cannons were used by the English at Crécy in 1346, it was only at the very end of the period that firearms really began to play a significant role. This was most notable in siege warfare, where the problems of transporting the massive cannons was less pressing than in battlefield use. The huge bombards used by the Ottomans against Constantinople in 1453 heralded a brief age in which strong fortifications were no longer a reliable protection for defending forces. It was not, however, until the introduction of iron balls, which meant cannons could be smaller, and corned powder (around 1420), which gave them more power, that field artillery became a possibility. The victory of the French at Castillon in 1453, when Jean Bureau’s cannons raked the English army and forced its flight, was perhaps the first example of a victory won through its use.

The first handguns had appeared in the early 1400s—by 1421 John the Fearless of Burgundy was said to have 4,000 in his army. Yet it was not until the introduction, from around 1450, of matchlock arquebuses, which were possible—just—to reload in combat, that the handgun began to find a place on the battlefield. Even so, the late 15th century was very much a time of transition: as late as 1494, half the French army that invaded Italy was composed of heavy cavalry, while, in contrast, the Swiss mercenaries who defeated the Burgundians at Nancy in 1477 were composed of a combined force of pikemen mixed with handgunners. The Burgundians could not penetrate the Swiss phalanx, leaving them vulnerable to volleys of fire from the handgunners.

By the early 16th century, the idea of military obligation in return for land had faded in western Europe and, elsewhere, states, such as those of the Ming and the Ottoman Turks were consolidating to such an extent that central resources were once again equal to deploying larger armies and keeping them in the field for extended periods. The world lay on the verge of a military revolution.

RENAISSANCE BATTLE

Serried ranks of heavily armored lance-wielding knights from Florence and Siena fought at the Battle of San Romano in 1432—a style of warfare soon to be rendered obsolete.



EUROPEAN SWORDS

IN MEDIEVAL EUROPE the sword was the most highly regarded of weapons. It was not only a magnificent weapon of war—often handed down through the generations—but had evolved into a symbol of status and prestige; a man became a knight by the dubbing of a sword on his shoulders. Early medieval swords were heavy cutting weapons that were used to hack their way through mail. The development of high-quality plate armor encouraged the introduction of sharply pointed thrusting swords, whose blades became progressively longer.



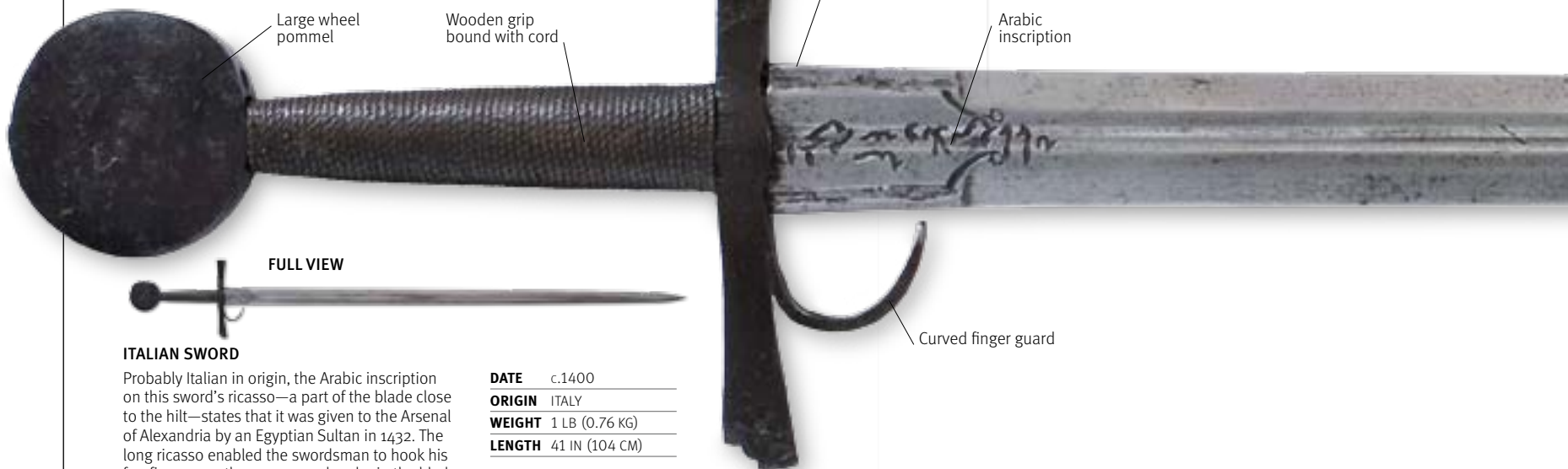
CRUSADER SWORD

This type of sword—with its broad blade, simple cross-guard, and pommel—became popular during the Crusades, and spread throughout Europe. The heavy cutting blade would have been devastating against lightly armed opponents.

DATE	12TH CENTURY
ORIGIN	WESTERN EUROPE
WEIGHT	2 LB (1.27 KG)
LENGTH	38 IN (96.5 CM)

Double-edged cutting blade

Heavily corroded blade



ITALIAN SWORD

Probably Italian in origin, the Arabic inscription on this sword's ricasso—a part of the blade close to the hilt—states that it was given to the Arsenal of Alexandria by an Egyptian Sultan in 1432. The long ricasso enabled the swordsman to hook his forefinger over the cross-guard and grip the blade, thereby providing better control.

DATE	c.1400
ORIGIN	ITALY
WEIGHT	1 LB (0.76 KG)
LENGTH	41 IN (104 CM)

Ricasso: part of blade close to hilt left unsharpened

Arabic inscription

Curved finger guard

FULL VIEW



"Scent-stopper" form pommel

Remains of wooden grip survive

Droplike terminals

Rose-window pattern

Circular cross-section, straight cross-guard

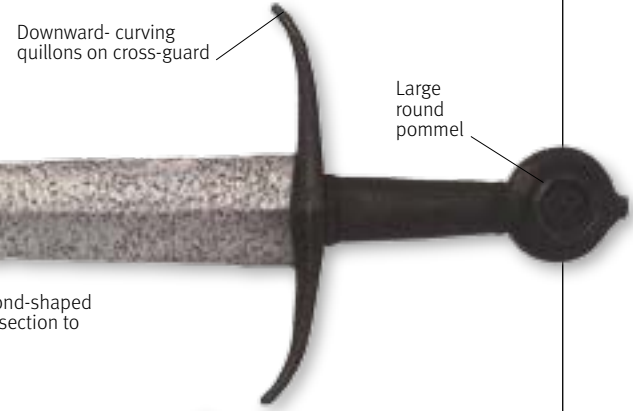
Traces of gilding

Straight two-edged blade

FRENCH SWORD

Reflecting the need to overcome the plate armor that was becoming increasingly common in the 14th century, this powerful sword would have been used for both delivering heavy cutting blows and for thrusting. The double-edged blade is wide at the hilt and tapers rapidly to a sharp point to penetrate an opponent's armor.

DATE	14TH CENTURY
ORIGIN	FRANCE
WEIGHT	2 LB (1.16 KG)
LENGTH	33 IN (85.7 CM)



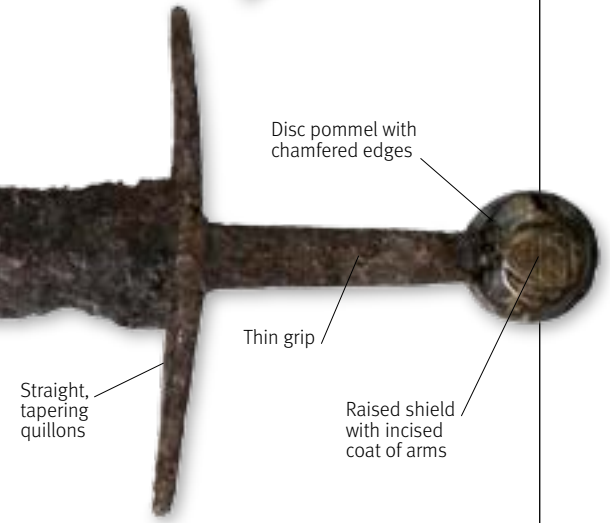
Sharp point for penetrating armor

Diamond-shaped cross-section to blade

RIDING SWORD

This heavily corroded sword, reputedly discovered in the Nene River in England, is termed a "riding sword." It has a decorated copper-alloy disc pommel, and quillons slightly inclining toward the blade, which is double-edged, and of a flattened diamond cross-section.

DATE	c.1325
ORIGIN	ENGLAND
WEIGHT	1 LB (0.71 KG)
LENGTH	31 IN (80 CM)



Straight, tapering quillons

Long double-edged blade

ENGLISH SWORD

This sword is distinguished by its long, tapering, and slightly down-curved quillons. Thought to be English-made, it has a short tang and a small wheel pommel, and its double-edged blade incorporates a single, shallow fuller for two-thirds of its length.

DATE	14TH CENTURY
ORIGIN	ENGLAND
WEIGHT	1 LB (0.76 KG)
LENGTH	41 IN (104 CM)

Fuller: a groove running down the blade to make it lighter while maintaining its strength

Heavily corroded with "bites" out of edge

Hexagonal cross-section quillons

Short tang

Small wheel pommel

Slender, down-curved tapering quillons

CASTILLON SWORD

This is one of a group of at least 80 swords said to come from the same find spot in Castillon, France, where a battle was fought between English and French forces in 1453. The iron hilt consists of a pommel of "scent-stopper" form, and a straight cross-guard with droplike ends. Vestiges of the original wooden grip and gilding survive.

DATE	MID 15TH-CENTURY
ORIGIN	ENGLAND
WEIGHT	2 LB (1 KG)
LENGTH	43 IN (109.2 CM)

EUROPEAN SWORDS



Long, tapering double-edged blade

HAND-AND-A-HALF SWORD

Also known as a “bastard” sword, this long-bladed weapon was primarily used for thrusting at an opponent. To improve direction and give greater power, it was provided with an extra long handle so that it could be gripped with both hands on occasion.

DATE EARLY 15TH CENTURY

ORIGIN ENGLAND

WEIGHT 3 LB (1.54 KG)

LENGTH 37 IN (119 CM)



H-shaped hilt usually made from wood or bone

Rounded guard

Distinctive one-sided pommel shape



Single-edged blade

BASELARD

This simple, single-edged short sword would ideally be used against lightly armored opponents. A weapon of the ordinary soldier, this sword type was popular in northwest Europe in the 14th and 15th centuries.

DATE 1480–1520

ORIGIN ENGLAND

WEIGHT 1 LB (0.57 KG)

LENGTH 27 IN (69 CM)



Forward quillon bent forward toward the blade

Extended one-sided pommel

Rear quillon extended backward

Single-edged blade



FULL VIEW

BRONZE GILDED SWORD

This ornate sword features bronze gilding to both the hilt and the pommel. The grip is made from black horn and is carved to flow into the fish-tailed pommel. The four-sided, double-edged blade is in remarkably good condition and tapers to a sharp fine point.

DATE 15TH CENTURY

ORIGIN ITALY

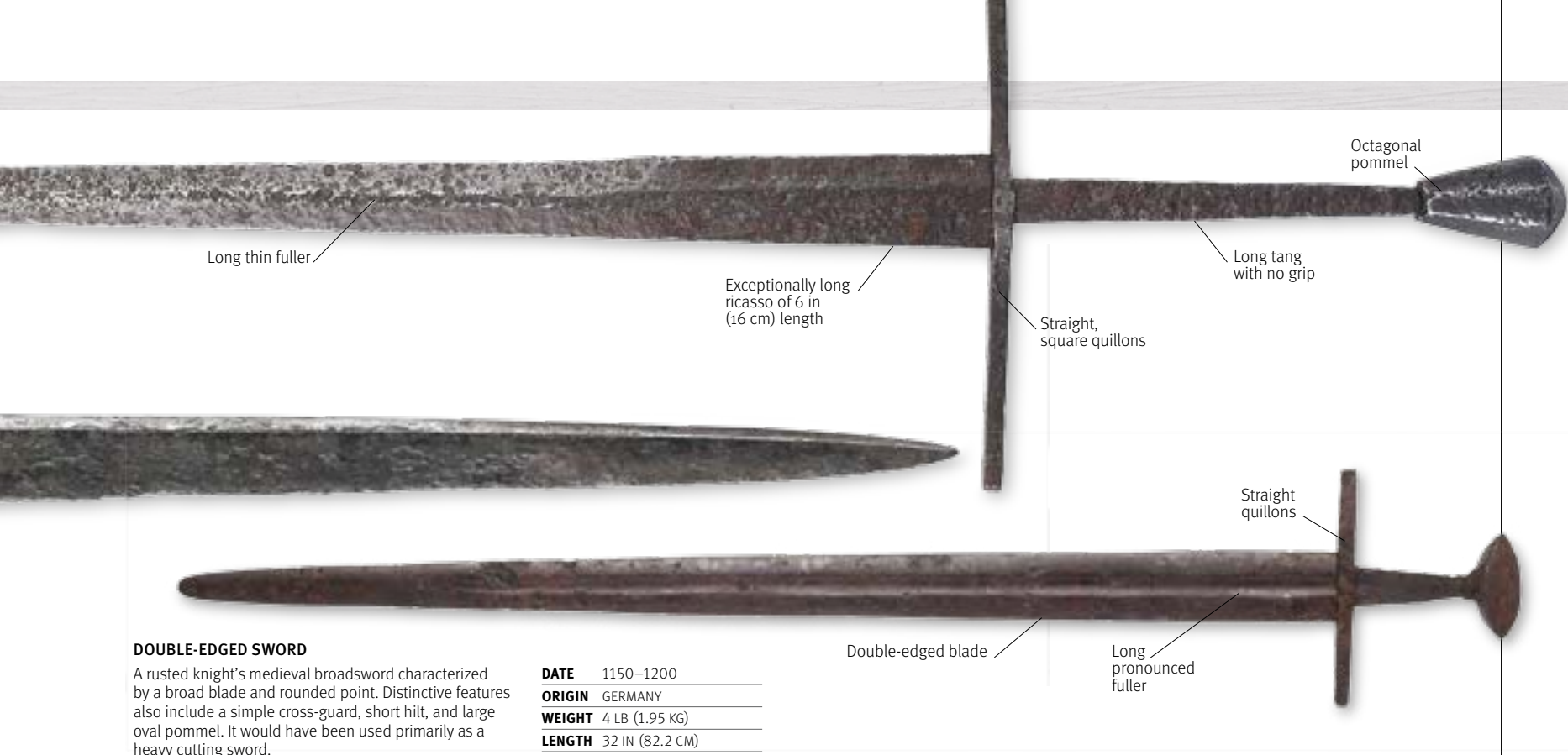
WEIGHT 3 LB (1.34 KG)

LENGTH 34 IN (88.3 CM)



Double-edged blade





DOUBLE-EDGED SWORD

A rusted knight's medieval broadsword characterized by a broad blade and rounded point. Distinctive features also include a simple cross-guard, short hilt, and large oval pommel. It would have been used primarily as a heavy cutting sword.

DATE	1150–1200
ORIGIN	GERMANY
WEIGHT	4 LB (1.95 KG)
LENGTH	32 IN (82.2 CM)

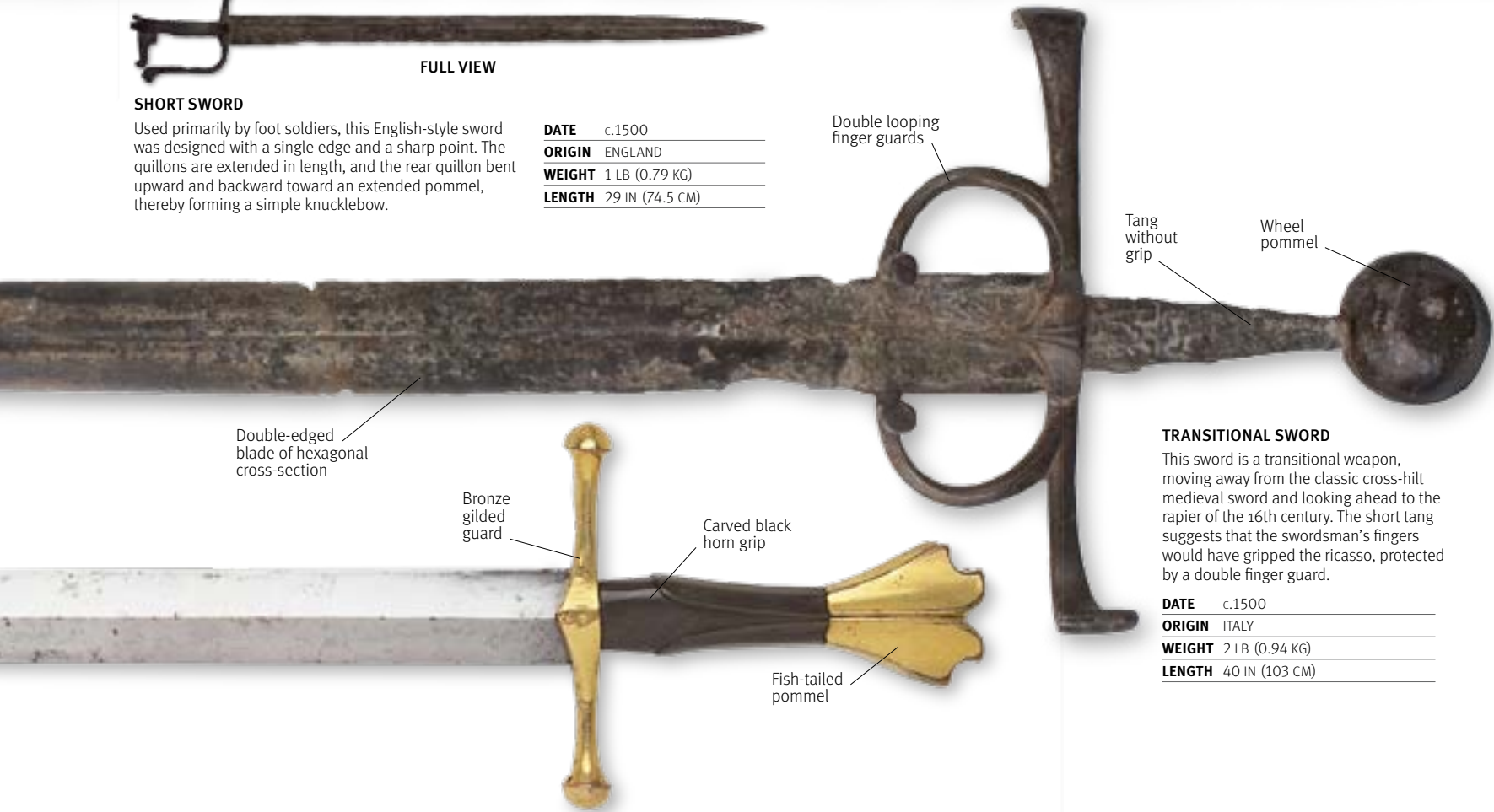


FULL VIEW

SHORT SWORD

Used primarily by foot soldiers, this English-style sword was designed with a single edge and a sharp point. The quillons are extended in length, and the rear quillon bent upward and backward toward an extended pommel, thereby forming a simple knucklebow.

DATE	c.1500
ORIGIN	ENGLAND
WEIGHT	1 LB (0.79 KG)
LENGTH	29 IN (74.5 CM)



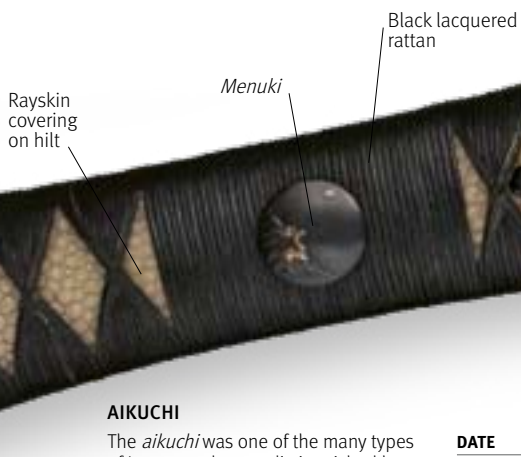
TRANSITIONAL SWORD

This sword is a transitional weapon, moving away from the classic cross-hilt medieval sword and looking ahead to the rapier of the 16th century. The short tang suggests that the swordsman's fingers would have gripped the ricasso, protected by a double finger guard.

DATE	c.1500
ORIGIN	ITALY
WEIGHT	2 LB (0.94 KG)
LENGTH	40 IN (103 CM)

JAPANESE AND CHINESE SWORDS

THE SWORDS USED by Japanese samurai warriors were among the finest cutting weapons ever made. Japanese swordsmiths were elite craftsmen who used a process of smelting, forging, folding, and hammering to create curved blades that were immensely hard, but not brittle. Only the steel of the sharp cutting edge was water-quenched to full hardness. The softer back of the blade (the *mune*) was used to block blows—the samurai carried no shield. Chinese swords, sometimes straight rather than curved, had little of the almost mystical prestige of their Japanese equivalents.



AIKUCHI

The *aikuchi* was one of the many types of Japanese dagger, distinguished by having no hand guard (*tsuba*). It was often carried by ageing samurai in semi-retirement. This *aikuchi*, shown with its scabbard, is a 19th-century reproduction of a medieval weapon.

DATE	19TH CENTURY
ORIGIN	JAPAN
WEIGHT	¼ LB (0.28 KG)
LENGTH	22 IN (c.55 CM)



Sageo (cord) fastened scabbard to belt



KATANA

The samurai's long sword, the *katana*, was worn with the cutting edge uppermost, so it could deliver a sweeping cut in a single movement. This *katana* is signed by swordsmith Kunitoshi.

DATE	1501
ORIGIN	JAPAN
WEIGHT	1½ LB (0.66 KG)
LENGTH	36¾ IN (94 CM)

Mune (flat back of blade)



Tsuba (hand guard)

Kashira (pommel)

Wooden hilt covered with ray- or sharkskin, then wrapped in braid

Sageo (cord) of gilded Dutch leather





Scabbard bound with gilt iron

CHINESE SWORD

This sword, decorated with Buddhist emblems, was made for presentation to a Tibetan monastery. It is shown in its leather-covered iron-bound wooden scabbard.

DATE c.1570
ORIGIN CHINA
WEIGHT 3 LB (1.30 KG)
LENGTH 35½ IN (90.3 CM)

Monster motif decoration on handguard



High *shinogi* (ridge line)

Kissaki (point)



Menuki (hilt ornaments)

Hamon (temper pattern) on blade edge

Scabbard coated with brown lacquer

WAKIZASHI

This 16th century-style *wakizashi* was a samurai's shorter sword, and was normally carried paired with the *katana*. A useful secondary weapon, it was worn indoors when the *katana* was set aside at the entrance.

DATE 17TH CENTURY
ORIGIN JAPAN
WEIGHT 1 LB (0.42 KG)
LENGTH 26½ IN (67 CM)



KATANA

Attributed to the Shizu group of swordsmiths, this *katana* blade dates from the Sengoku period. The sword could be used with one hand, though a two-handed grip was needed for full power.

DATE 15TH CENTURY
ORIGIN JAPAN
WEIGHT c.1¼ LB (1 KG)
LENGTH 42 IN (107 CM)

TACHI MOUNTING

The *tachi* sword was worn slung from a belt, to which it was attached by the *sageo* (cord) on its scabbard. In this late example of an earlier style, the *sageo* is made of gilded leather, traded from the Dutch. The *tachi* was, for most of Japanese history, the proper mount to be worn with armor.

DATE 18TH CENTURY
ORIGIN JAPAN
WEIGHT ¼ LB (0.13 KG)
LENGTH 29¼ IN (74.5 CM)



Laquered wooden scabbard

Kojire (scabbard end)

EUROPEAN DAGGERS

THE VAST ARRAY of medieval dagger types was used mainly for thrusting at an opponent: for self-defense, assassinations, and for close-combat fighting where a sword would be too cumbersome. Traditionally, daggers were considered a weapon of the low-born, but, during the 14th century, men-at-arms and knights began to carry them, the weapon normally being worn at the right hip.



QUILLON DAGGER

So named because it resembles a scaled-down version of a sword, with prominent quillons that curve down toward the blade. This example has an unusual pommel—mirroring the quillons—that is curled around a rivet. Sword daggers were typically carried by men of high rank, especially when not wearing armor.

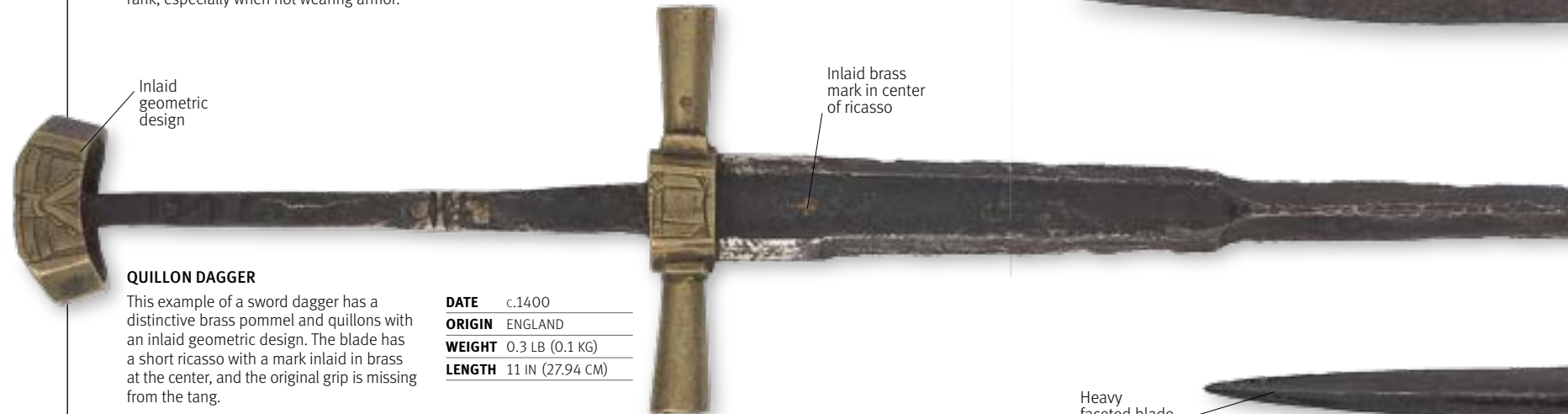
DATE 14TH CENTURY

ORIGIN ENGLAND

WEIGHT 0.2 LB (0.1 KG)

LENGTH 12 IN (31 CM)

Double-edged blade with rectangular cross-section



QUILLON DAGGER

This example of a sword dagger has a distinctive brass pommel and quillons with an inlaid geometric design. The blade has a short ricasso with a mark inlaid in brass at the center, and the original grip is missing from the tang.

DATE c.1400

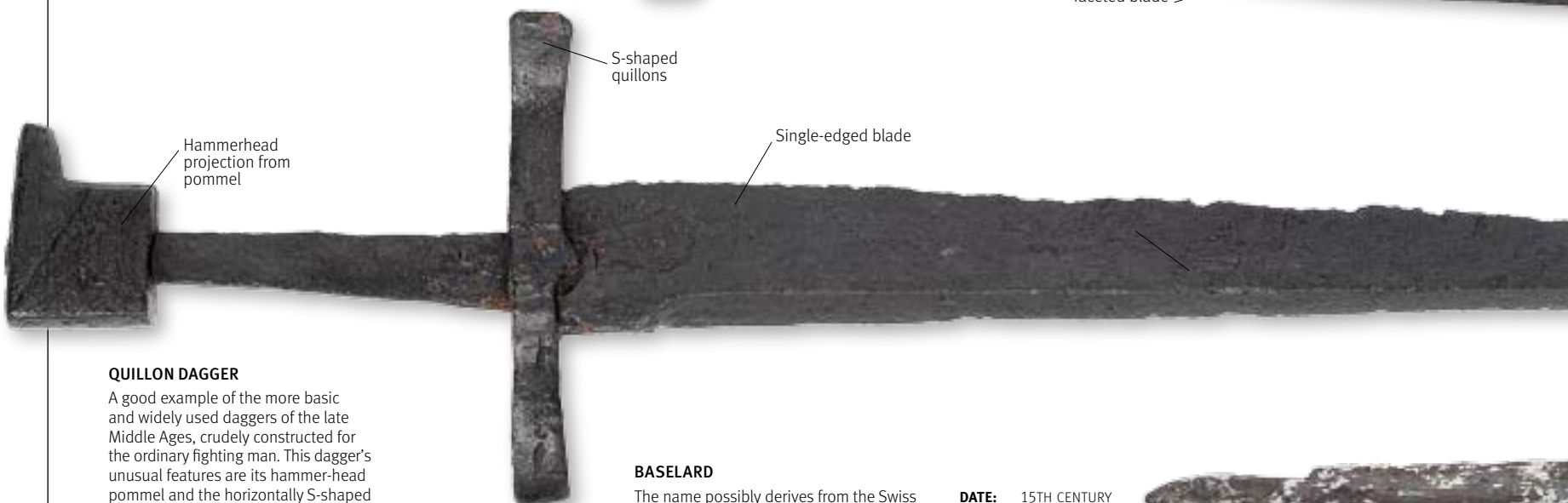
ORIGIN ENGLAND

WEIGHT 0.3 LB (0.1 KG)

LENGTH 11 IN (27.94 CM)

Inlaid brass mark in center of ricasso

Heavy faceted blade



QUILLON DAGGER

A good example of the more basic and widely used daggers of the late Middle Ages, crudely constructed for the ordinary fighting man. This dagger's unusual features are its hammer-head pommel and the horizontally S-shaped quillons of the guard.

DATE 15TH CENTURY

ORIGIN ENGLAND

WEIGHT 0.6 LB (0.29 KG)

LENGTH 15 IN (40 CM)

Single-edged blade

S-shaped quillons

Hammerhead projection from pommel

BASELARD

The name possibly derives from the Swiss city of Basel, and the baselard (or basilard) was in use throughout western Europe in the 14th and 15th centuries. This example has a reconstructed H-shaped hilt—made of bone—combined with the original broad blade that tapers to a sharp point.

DATE: 15TH CENTURY

ORIGIN: EUROPE

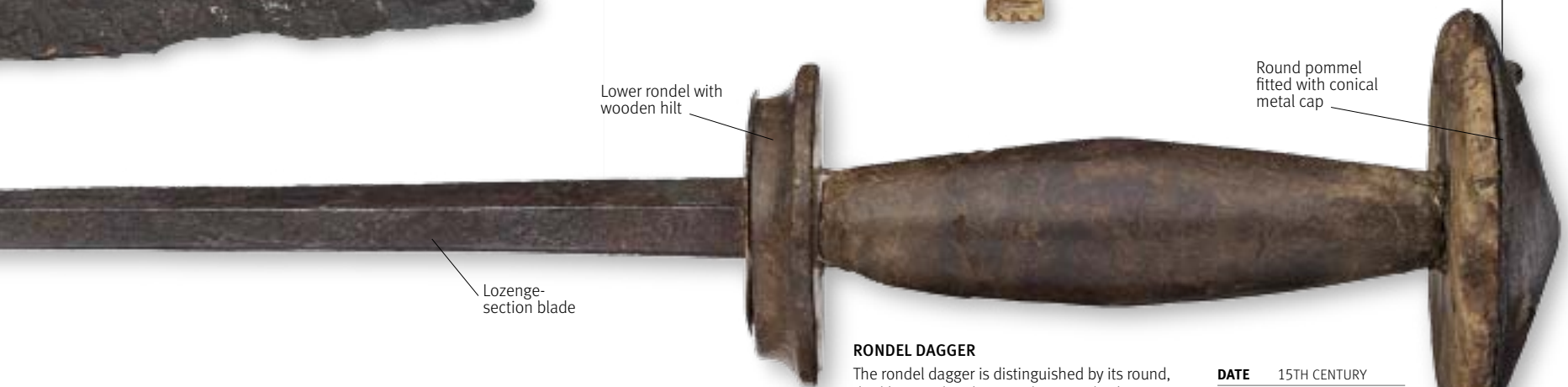
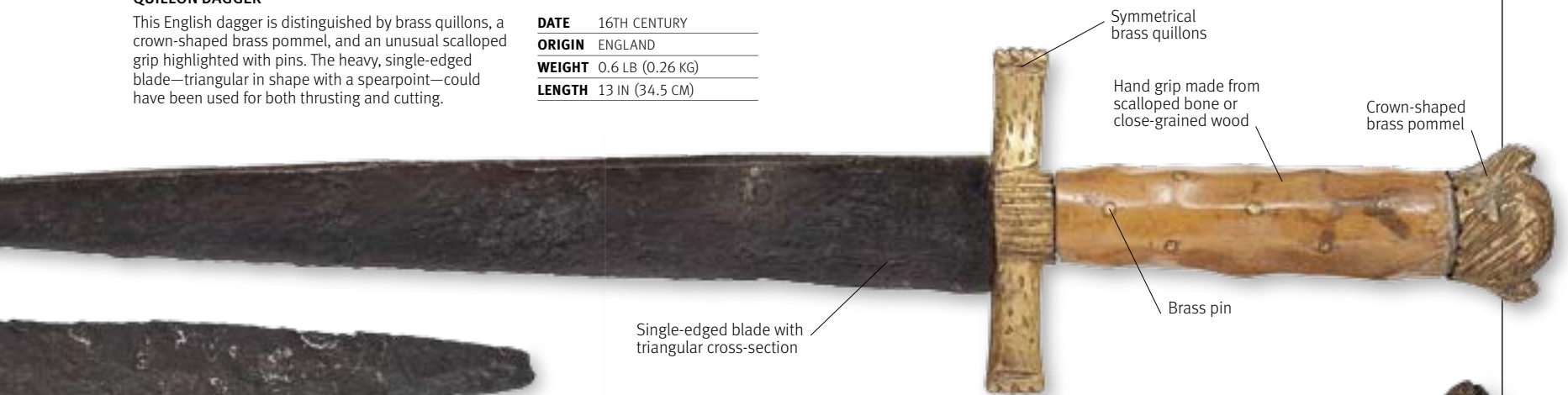
WEIGHT 0.3 LB (0.14 KG)

LENGTH 12 IN (30.5 CM)

QUILLON DAGGER

This English dagger is distinguished by brass quillons, a crown-shaped brass pommel, and an unusual scalloped grip highlighted with pins. The heavy, single-edged blade—triangular in shape with a spearpoint—could have been used for both thrusting and cutting.

DATE	16TH CENTURY
ORIGIN	ENGLAND
WEIGHT	0.6 LB (0.26 KG)
LENGTH	13 IN (34.5 CM)



RONDEL DAGGER

The rondel dagger is distinguished by its round, disclike guard and pommel. It was also known as a *dague à rouelles* and was a popular dagger with the gentry and aristocracy. In this example, the tang runs directly through the hand grip and attaches to the pommel.

DATE	15TH CENTURY
ORIGIN	ENGLAND
WEIGHT	0.5 LB (0.23 KG)
LENGTH	13 IN (35 CM)



BALLOCK DAGGER

Also euphemistically known as a “kidney dagger,” this weapon was named after the distinctive shape of its guard, with two rounded lobes. The ballock dagger was used throughout Europe, although it was most popular in England and the Low Countries, and equipped soldiers of all ranks.

DATE	c.1500
ORIGIN	ENGLAND
WEIGHT	0.4 LB (0.17 KG)
LENGTH	13 IN (34.9 CM)





BATTLE OF HATTIN

Using crossbows, arrows, swords, and staff weapons, as well as the heat of the desert, Saladin and his army defeated the Christian crusaders in 1187 at the Horns of Hattin, near Lake Tiberias in northern Palestine. The loss of this battle was a disaster that led to the destruction of the Kingdom of Jerusalem.



EUROPEAN STAFF WEAPONS

THE LONG, TWO-HANDED staff weapons of the Middle Ages were used primarily by infantrymen as a defense against the usually invincible armored knight. At the battle of Courtrai in 1302, a rag-tag army of Flemish peasants and townspeople defeated a force of armored French cavalry using long, axlike weapons, a forerunner of the halberd. Cavalry were also armed with pole arms, although these were single-handed weapons such as the war hammer and mace. They could be wielded on horseback and were capable of causing severe injuries to even the best-protected men.



FULL VIEW

Hammer head

Rondel to protect hands

Langet: steel strip to protect shaft from edged weapons

Long thin spike

POLEAX

The poleax was a multi-purpose weapon: the spike was used for thrusting, the ax blade for cutting through armor, and the hammer head for crushing tissue and bones. This poleax has long langets and a rondel or disc to protect the bearer's hands from weapons sliding down the shaft.

DATE 1470
ORIGIN FRANCE
LENGTH HEAD 12½ IN (32 CM)



Fluke

Broad axhead

Langet

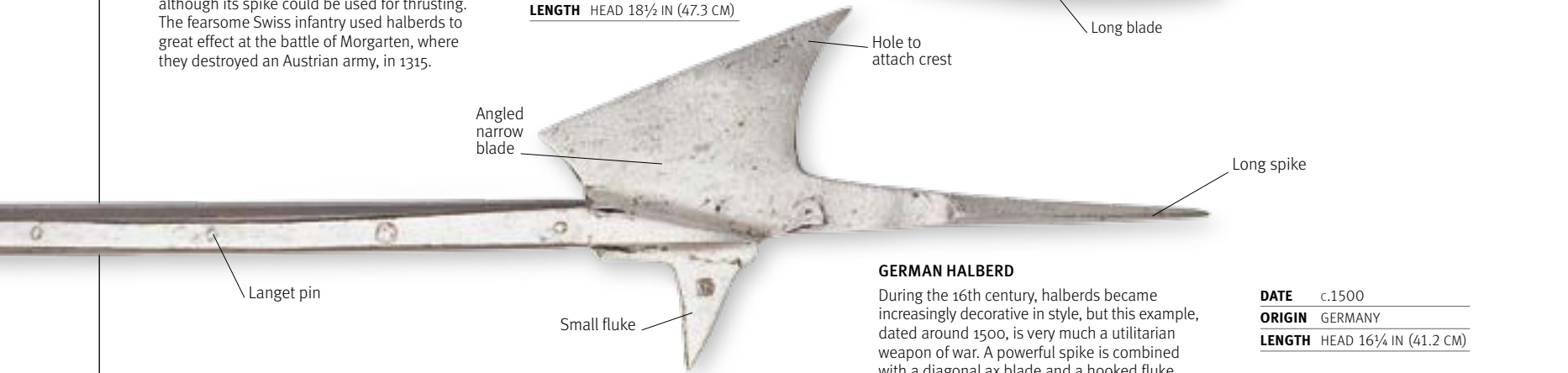
Socket

Spike

HALBERD

Developed by the Swiss in the 13th century, the halberd was primarily a slashing weapon, although its spike could be used for thrusting. The fearsome Swiss infantry used halberds to great effect at the battle of Morgarten, where they destroyed an Austrian army, in 1315.

DATE c.1480
ORIGIN SWITZERLAND
LENGTH HEAD 18½ IN (47.3 CM)



Hole to attach crest

Long blade

Angled narrow blade

Long spike

Langet pin

Small fluke

GERMAN HALBERD

During the 16th century, halberds became increasingly decorative in style, but this example, dated around 1500, is very much a utilitarian weapon of war. A powerful spike is combined with a diagonal ax blade and a hooked fluke.

DATE c.1500
ORIGIN GERMANY
LENGTH HEAD 16¼ IN (41.2 CM)



Attachment of lower part of blade to shaft

Small spike

BARDICHE

Popular in Scandinavia, Eastern Europe, and Turkey from the 15th to 17th centuries, the bardiche was a form of poleax. A particular feature of the weapon was the attachment of the lower end of the axhead to the wooden shaft.

DATE LATE 15TH CENTURY
ORIGIN RUSSIA
LENGTH HEAD 30¾ IN (77 CM)

Long curved blade

WAR HAMMER

The single-handed war hammer typically comprised a blunt hammer head or set of claws at the front with a sharp pick at the back. The war hammer became increasingly popular during the Hundred Years War (1337–1453), although it had been in use since the 13th century.

DATE LATE 15TH CENTURY
ORIGIN ITALY
LENGTH 27¼ IN (69.5 CM)

Pick for piercing armor

Richly etched gilt decoration

Hammer head to stun opponent

Wooden shaft with langets

BRONZE MACE

The mace was a clublike weapon usually made entirely of metal, or, at least, with a metal head. This example of a simple mace consists of a circular bronze head—with vertical ridges or flanges—and a thick wooden shaft. Like the war hammer, maces were popular with cavalrymen.

DATE 14TH CENTURY
ORIGIN EUROPE
LENGTH 3¼ IN (8 CM)

Bronze head with vertical flanges

Wooden shaft

Leaf-shaped spike

Engraved geometric design on blade

ENGRAVED AXHEAD

Favored weapons of the Vikings, axes continued to be used by warriors in the Middle Ages, often thrown with deadly accuracy. The Bayeux Tapestry shows several instances of foot soldiers using axes, both single- and double-handed.

DATE MEDIEVAL
ORIGIN GERMANY

Socket for shaft

MACE HEAD

Cast from a copper alloy, this mace head was originally thought to have dated back to the Bronze Age, but is now believed to come from the 12th–13th centuries. The hollow-socketed head features several short spikes.

DATE 12–13TH CENTURIES
ORIGIN EUROPE
LENGTH HEAD 3¼ IN (8 CM)

Short curved spikes



Fine tapering point

LANCE HEAD

The lance was a defining weapon of the medieval knight, and used the momentum of the knight's horse to deadly effect. A typical lance was 169 in (430 cm) in length, the shaft made from a wood such as ash, and fitted with a small iron or steel head.

DATE MEDIEVAL
ORIGIN EUROPE
LENGTH 7½ IN (19 CM)

LONG-HANDLED AX

In the 11th century, axes were used by the English Saxons and Scandinavian warriors, but during the next two centuries, the ax became common throughout continental Europe. This long-handled ax would have been used with both hands.

DATE 13TH CENTURY
ORIGIN EUROPE

Circular socket to attach ax blade to top of shaft

Pronounced spike



Circular curved blade



Extended tang to attach axhead to shaft

Gilt ax butt with scrolls

SHORT AX

Although heavily rusted, the highly curved blade of this single-handed ax is clearly visible. Instead of the shaft being inserted into a socket on the axhead, here a tanglike projection is forced into the shaft. Another distinctive feature is the long spike at the back of the head.

DATE 14TH CENTURY
ORIGIN EUROPE

ASIAN STAFF WEAPONS

MEDIEVAL ASIAN ARMIES deployed a wide range of staff weapons, including maces and long-handled battle axes, and weapons with blades or pointed heads. Staff weapons generally evolved from agricultural implements or from simple clubs, but they could be highly effective in face-to-face combat. Although gradually rendered obsolete by the gunpowder revolution, many such weapons remained in use, virtually unaltered, in some Asian armies into the 18th and even 19th centuries.



Tang—to be fitted to shaft

Holes for pegs to fix tang to shaft



Grip

MUGHAL MACE

This 16th century-style mace is in essence little more than a curved solid iron bar, but it could undoubtedly deliver a powerful blow if energetically wielded. Maces of this kind were used by Mughal soldiers during the conquest of India in the 1500s. They are recognizable in many miniature paintings that represent the Mughals at war.

DATE 18TH CENTURY

ORIGIN INDIA

WEIGHT 3 LB (1.5 KG)

LENGTH 30 IN (77.5 CM)



Central grip

Protective knucklebow

DECORATED IRON MACE

This splendid mace dates from the period of Chinese history in which the rule of the Mongol invaders was overthrown and the native Ming dynasty took power. The elaborate decoration suggests that it would have served a warrior of high status, possibly a member of the Mongol elite fighting on horseback.

DATE 14TH CENTURY

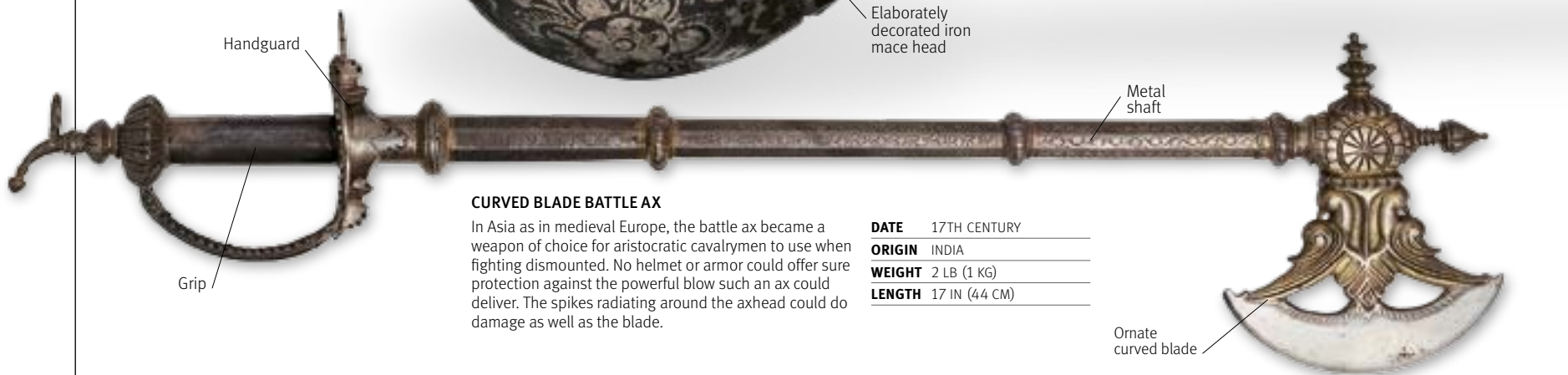
ORIGIN CHINA OR MONGOLIA

WEIGHT 2 LB (1.17KG)

LENGTH 15 IN (40 CM)



Elaborately decorated iron mace head



Handguard

Grip

Metal shaft

CURVED BLADE BATTLE AX

In Asia as in medieval Europe, the battle ax became a weapon of choice for aristocratic cavalymen to use when fighting dismounted. No helmet or armor could offer sure protection against the powerful blow such an ax could deliver. The spikes radiating around the axhead could do damage as well as the blade.

DATE 17TH CENTURY

ORIGIN INDIA

WEIGHT 2 LB (1 KG)

LENGTH 17 IN (44 CM)

Ornate curved blade

NAGINATA

The *naginata*, a Japanese cousin of the European glaive, consists of a long, curved blade attached to a wooden shaft. It was a standard weapon of foot soldiers in medieval Japan, but was especially associated with fighting monks, the *sohei*. They are described by Japanese chroniclers as entering battle “whirling their *naginata* like waterwheels.”

DATE c.1600–1700
ORIGIN JAPAN
WEIGHT 1 LB (0.62 KG)
LENGTH 41 IN (105 CM)



SAINTIE

Known as a *saintie*, this 16th century-style Indian spear is a parrying weapon—its function is both defensive and offensive. The shaft could be used like a staff to deflect hostile blows, while the spearpoint was thickened to allow a thrust to penetrate clothing or armor.

DATE 18TH CENTURY
ORIGIN INDIA
WEIGHT 2 LB (0.97 KG)
LENGTH 35 IN (89.8 CM)



BRONZE CARVED MACE HEAD

Dating from the period when Persia was dominated by the Seljuk Turks, this hollow mace head is made of bronze. It has raised fins around the edges to focus the impact of a blow. The mace head has been decorated with foliage and calligraphy in a fine tradition of Islamic craftsmanship.

DATE 12TH CENTURY
ORIGIN PERSIA
WEIGHT 1 LB (0.8 KG)
LENGTH 4 IN (11.5 CM)

OTTOMAN GURZ

The armies of the Ottoman Turks had varieties of mace or “gurz” among their richly diversified weaponry. This reproduction hollow steel weapon could have been more deadly against an armored Christian knight than any sword, capable of concussing an enemy or breaking his bones without penetrating the armor.

DATE 18TH CENTURY
ORIGIN TURKEY
WEIGHT 2 LB (1.16 KG)
LENGTH 27 IN (70 CM)



SMALL
MONGOLIAN
DAGGER

MONGOL WARRIOR

IN THE 13TH CENTURY, the Mongol horsemen of the Asian steppe were the world's most effective fighting men. Under the leadership of Genghis Khan and his successors, they created an empire that stretched from China and Korea to the eastern edge of Europe. Totally without humane sentiment, the Mongols had a well-earned reputation for massacre, using terror systematically to weaken the resolve of their enemies. But the foundation of their success lay in traditional military qualities: rapidity of movement, disciplined battlefield maneuver, and the ruthless pursuit of decisive victory.



MOUNTAIN WARFARE
Mongol warriors fighting the Chinese in steep mountain terrain. Both sides carry typically Mongol recurved bows and round shields.

HARDY HORSEMEN

Every Mongol tribesman was a warrior. From early childhood he learned to fire an arrow and ride a horse, the two essential skills of steppe warfare. The harsh life of the Asian steppe taught toughness and endurance, while the disciplined mass maneuvers required for an effective war of movement were learned on tribal hunting expeditions.

Organized into army groups 10,000 strong, the Mongol horsemen swept across Eurasia at a speed of up to 60 miles (100 km) a day. Each man had a string of horses, so he could change mount when necessary. The horses were also a mobile source of food—warriors drank their milk and their blood. Advancing in columns preceded by scouts, the Mongols sought to destroy enemy armies.

Most of the horsemen were archers, using their composite bows in hit-and-run warfare familiar to all steppe nomads—closing in to release their volleys of arrows, fleeing before the enemy could engage them, and ambushing any foe foolish enough to pursue them. After the archers had done their work, the Mongols' elite fighters, armed with lances, maces, and swords, would close in to finish off the already decimated enemy. Over time, the Mongol armies adapted to siege warfare and even naval operations, exploiting the skills of conquered peoples, Muslim and Chinese. But their political skills were never equal to the task of retaining the power won by their military prowess.

WAR LEADER

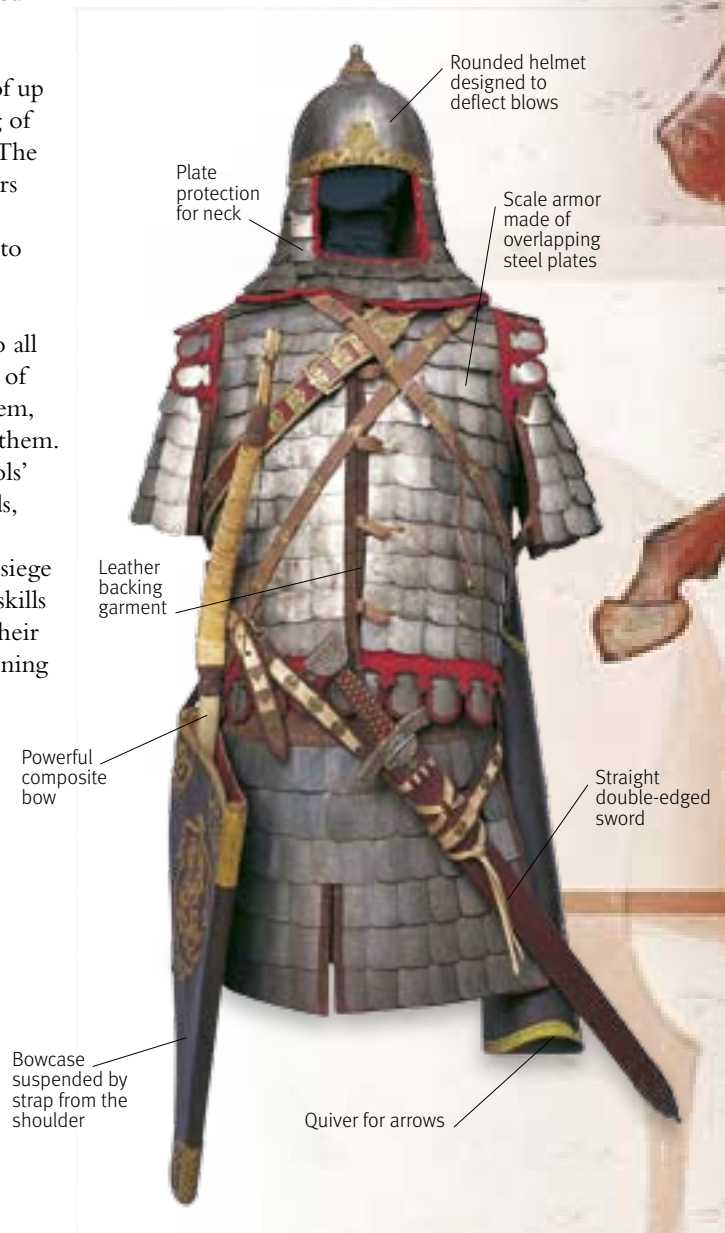
Born around 1162, Genghis Khan was a chief's son in one of the many warring nomadic tribes that inhabited the Mongolian steppe. An aggressive warrior and a skilled diplomat, by 1206 he had united the tribes under his rule. He led them in campaigns against the Chinese Empire to the east and the empire of Khwarazam in central Asia. Genghis died in 1227, but his sons and grandsons continued his work of empire building.

PORTRAIT OF GENGHIS KHAN



WARRIOR ARMOR

Most Mongol warriors fought as light horsemen, wearing leather body armor and, if possible, a silk undershirt—allegedly offering protection against an arrow shot. Their minority of heavy cavalry, however, were sometimes equipped with Chinese-style metal armor. Made of overlapping plates, usually sown onto a backing garment, this is a replica of a mongol armor that was flexible and offered good protection in close combat.



GREAT WARRIORS

GENGHIS KHAN ON HORSEBACK
The Mongol leader is shown here in the costume of a light horseman. Warriors usually shot their bows from horseback, and also used swords belonging to both the Islamic and Chinese traditions.

TOOLS OF COMBAT



DAO: CHINESE SWORD



DAO: CHINESE SWORD



SMALL MONGOLIAN DAGGER



JIAN: CHINESE SWORD



JIAN SCABBARD

“WHOEVER DOES NOT SURRENDER
BUT OPPOSES WITH STRUGGLE AND
DISSENSION, SHALL BE ANNIHILATED.”

ORDER OF GENGHIS KHAN TO HIS ARMY

LONGBOWS AND CROSSBOWS

INVENTED IN CHINA, the crossbow came into widespread use in Europe from the 12th century. Fired from the shoulder, it was both powerful and accurate, effective against armored knights and in siege warfare. The longbow was developed in Wales and was used in the English Army from the 13th to the 16th century. It is given credit for victories at Crécy, Poitiers, and Agincourt. Capable of ten times the rate of fire of crossbows, longbows were typically shot in unaimed volleys, decimating an advancing enemy with sheer volume of arrows.

Steel pin to engage mechanism for spanning bow

Wooden stock or tiller with stag-horn veneer carved in relief

Groove for bolt

Revolving nut released by trigger below



FULL VIEW

HUNTING CROSSBOW

The crossbow was an effective weapon for hunting because the hunter could carry the bow spanned and loaded with a bolt, ready to shoot.

DATE c.1460

ORIGIN EUROPE

WEIGHT 9½ LB (4.4 KG)

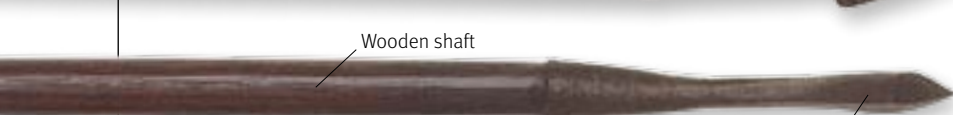
LENGTH 28¼ IN (72 CM)



Iron tip



Broadhead bolt



Wooden shaft



Bodkin arrowhead



Triangular head



CROSSBOW BOLTS

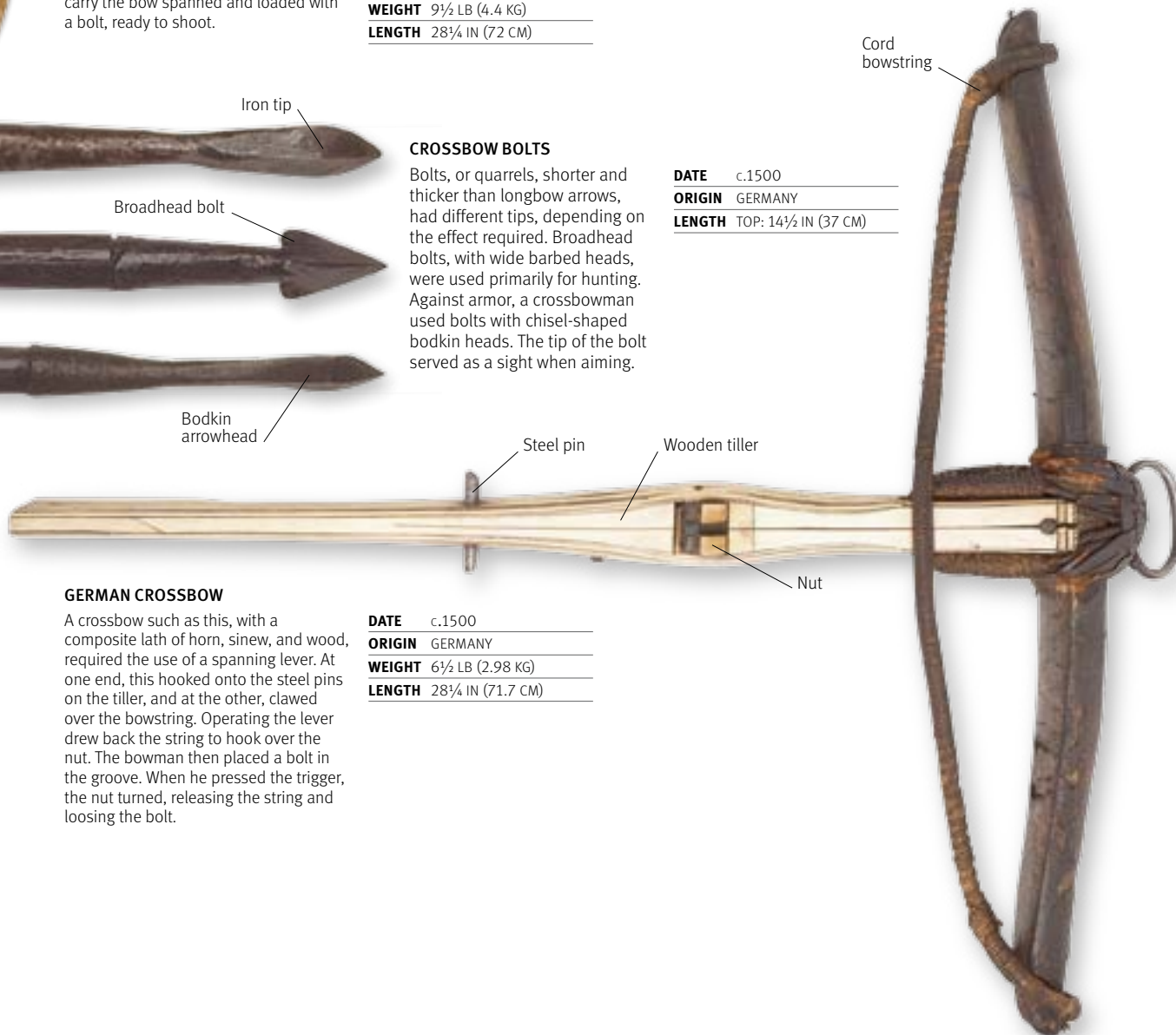
CROSSBOW BOLTS

Bolts, or quarrels, shorter and thicker than longbow arrows, had different tips, depending on the effect required. Broadhead bolts, with wide barbed heads, were used primarily for hunting. Against armor, a crossbowman used bolts with chisel-shaped bodkin heads. The tip of the bolt served as a sight when aiming.

DATE c.1500

ORIGIN GERMANY

LENGTH TOP: 14½ IN (37 CM)



Cord bowstring

Steel pin

Wooden tiller

Nut

GERMAN CROSSBOW

A crossbow such as this, with a composite lath of horn, sinew, and wood, required the use of a spanning lever. At one end, this hooked onto the steel pins on the tiller, and at the other, clawed over the bowstring. Operating the lever drew back the string to hook over the nut. The bowman then placed a bolt in the groove. When he pressed the trigger, the nut turned, releasing the string and loosing the bolt.

DATE c.1500

ORIGIN GERMANY

WEIGHT 6½ LB (2.98 KG)

LENGTH 28¼ IN (71.7 CM)



Tip would have had horn nock to hold bowstring

Sinew binding lath to stock

Stirrup for holding crossbow with foot while spanning

Bowstring of twisted cord

Bow is single stave of yew

Composite prod or lath

ENGLISH LONGBOW

This is one of the longbows retrieved from the wreck of Henry VIII's warship the *Mary Rose*, which sank in 1545. It is a simple bow, cut from a length of yew, but the bowyer has skillfully taken advantage of the natural layering of the wood. The flat back of the bow is sapwood, which performs better under tension, while the rounded belly is heartwood, reacting best under compression. Using a replica of a bow from the *Mary Rose*, a modern archer shot an arrow a distance of 360 yards (328 m).

DATE	c.1540
ORIGIN	ENGLAND
WEIGHT	1½ LB (0.73 KG)
LENGTH	78¾ CM (2 M)



ARCHERS IN ACTION

An archer needed considerable strength to draw the longbow—medieval archers' skeletons have been found with enlarged left arms and other deformities. They were expected to loose six aimed or 12 unaimed shots per minute.



Shaft of ash or birch

Nock fits in bowstring

Three flights made from goose feathers

ENGLISH LONGBOW ARROWS

"Clothyard" arrows were mass-produced in medieval England to supply the king's longbowmen. The three feathers were essential to stabilize the arrow in flight.

DATE	c.1520
ORIGIN	ENGLAND
WEIGHT	1½ OZ (42 G)
LENGTH	29½ IN (75 CM)



Sharp point and edges

Barb

BARBED ARROWHEADS

Broad-barbed iron arrowheads could cause a deep, wide wound, and were extremely difficult to extract. Not ideal for penetrating armor, they came to be used for hunting more than for warfare.

DATE	C.1500
ORIGIN	EUROPE
WEIGHT	LEFT: 1 OZ (28.3 G)
LENGTH	LEFT: 1¾ IN (4.5 CM)

CROSSBOW

THIS TYPICAL LATE MEDIEVAL European hunting bow could shoot a bolt roughly 328 yards (300 m). Its composite lath (or bow), made of layers of wood, sinew, and horn, had far too high a draw-weight to be spanned by unaided muscle power. Using the rack-and-pinion device known as a cranequin (also called a cric or rack), the archer pulled the bowstring back to the nut, where it was hooked until released by pressing the long trigger under the crossbow tiller. When shooting, the huntsman rested the butt of the crossbow on his shoulder, looking along the tiller and using the tip of the bolt as his sight.



CROSSBOW BOLT

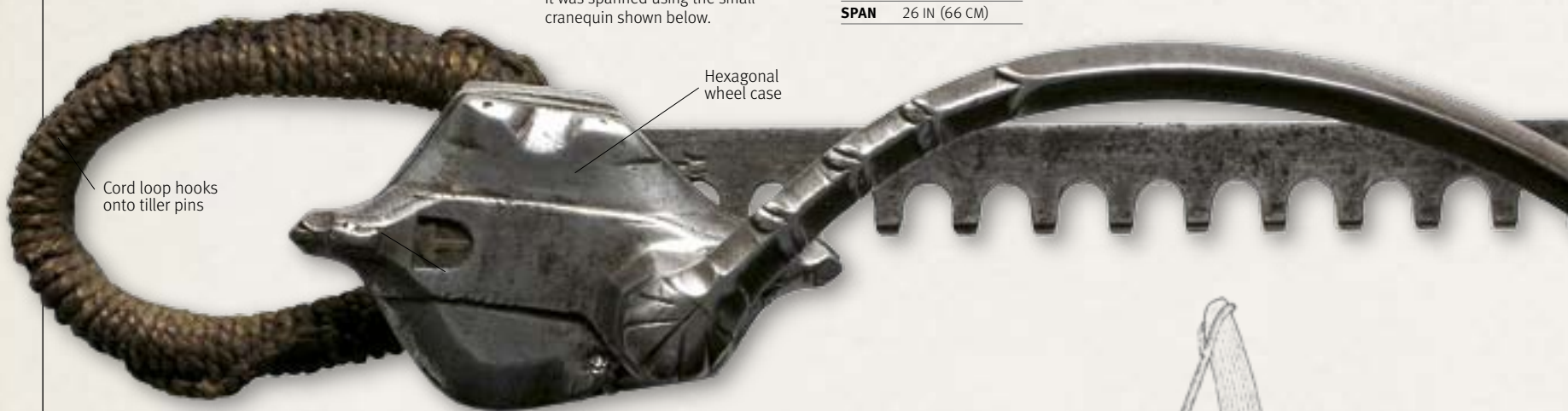
Bolts were typically twice as heavy as other arrows. The flights were of wood or paper, and only two were used, because a third would snag on the nut.



CROSSBOW

This German crossbow, with its handsome bone veneer, would have belonged to a wealthy individual who enjoyed hunting as a leisure pursuit. It was spanned using the small cranequin shown below.

DATE	c.1500
ORIGIN	GERMANY
WEIGHT	6½ LB (2.98 KG)
LENGTH	28 IN (71 CM)
SPAN	26 IN (66 CM)



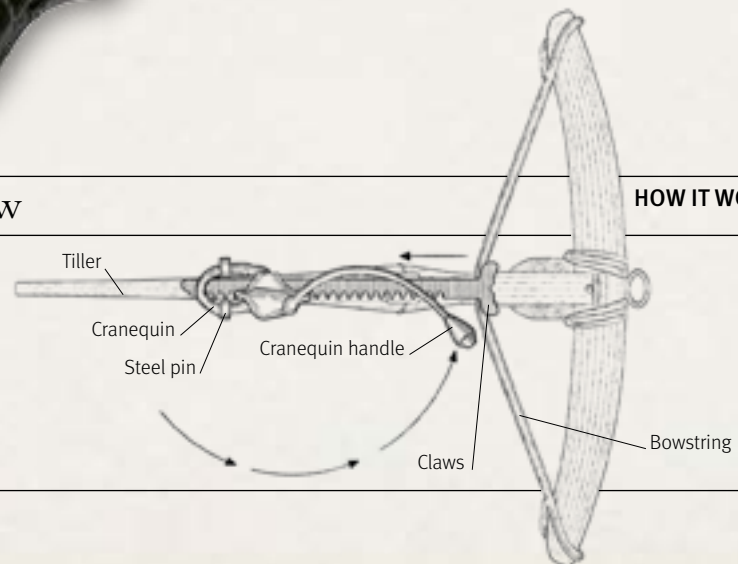
CRANEQUIN

The cranequin was first introduced in Europe in the late 14th century. One of its advantages was that it could be employed on horseback. It was an expensive device and worked slowly—two considerations that made it less suitable for warfare than for use by wealthy huntsmen.

Preparing The Crossbow

To use a cranequin, the archer first anchored it to the crossbow by looping the cord over the steel pins on the tiller. The claws at the front end of the toothed rack lay over the bowstring. By turning the lever, the archer rotated geared cogwheels engaged with the teeth of the rack, thus drawing the bowstring and bending the bow. When the string was hooked over the nut, the archer removed the cranequin, laid a bolt in the groove, and was ready to shoot.

HOW IT WORKS



WEAPON SHOWCASE



Tiller tapers to butt

FULL VIEW

Triangular metal head

Tiller veneered with plain bone

Composite bow of horn, sinew, and wood

Cord bridle binds tiller to lath

Toothed rack

Curved claws grip bowstring

Steel handle of lever

Cord bowstring

AZTEC WEAPONS AND SHIELDS

WARFARE IN THE AZTEC EMPIRE, which covered much of what is now Mexico, was driven by the need for a regular supply of prisoners for human sacrifice. Although the Aztecs had bows, slings, and throwing spears, they preferred to use close-quarters cutting weapons to disable an enemy, often by a blow to the legs. Ultimately, the “stone-age” Aztec weaponry proved no match for the steel and gunpowder of the Spanish invaders who conquered the region in the 16th century.



OBSIDIAN KNIFE

The Aztecs referred to human sacrifice as “the flowered death by the obsidian knife.” Obsidian, a volcanic glass, provided a razor-sharp blade that Aztec priests used to cut out the hearts of sacrificial victims. After the heart had been ritually burned, the corpse was dismembered.

DATE c.1500
ORIGIN AZTEC EMPIRE
LENGTH 11¾ IN (30 CM)



Serrated edge



FLINT KNIVES

Practical and easy to make by flaking, flint knives like these two examples had a wide range of uses in Aztec society. Aztec priests often used them to carry out human sacrifice in preference to obsidian knives because obsidian, although sharper than flint, was extremely brittle.

DATE c.1500
ORIGIN AZTEC EMPIRE
LENGTH 11¾ IN (30 CM)



Eyes made of shell and obsidian or haematite

Teeth shaped from shell

Knives were sometimes decorated to resemble the face of the god to whom sacrificial hearts were offered

DECORATED FLINT KNIFE

This decorated flint knife was found in the Great Temple, which stood in the center of the Aztec capital, Tenochtitlan. More than 20,000 victims may have been sacrificed at the dedication of the Temple in 1487.

DATE c.1500
ORIGIN AZTEC EMPIRE
LENGTH 11¾ IN (30 CM)

Head and shaft are made of wood

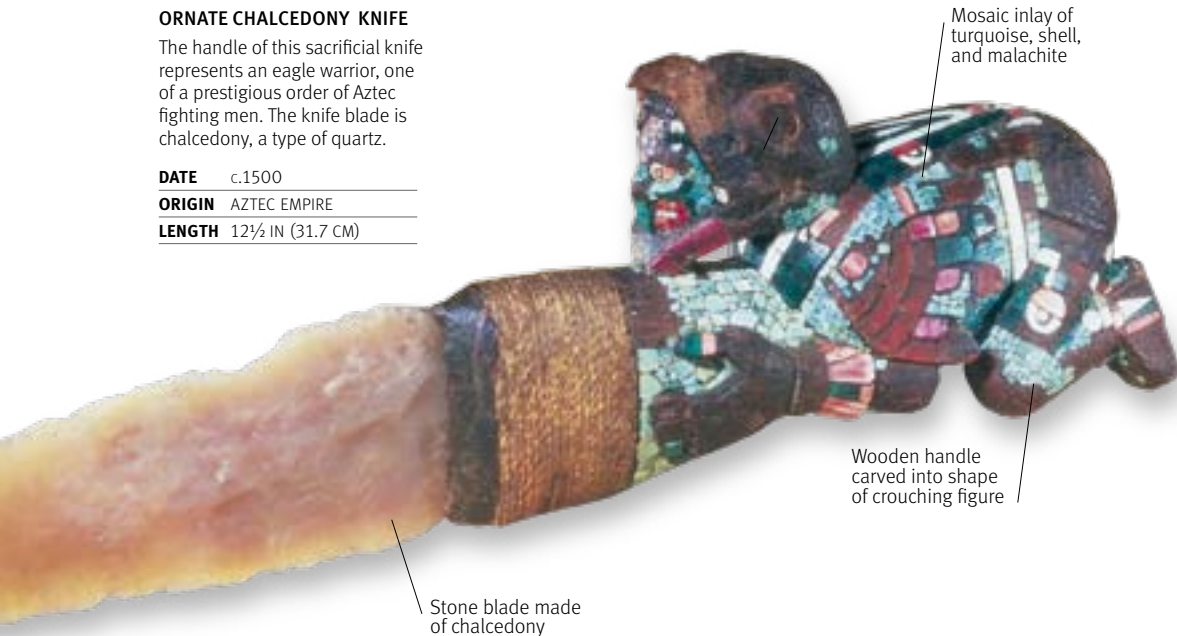
Obsidian blade set in grooves along edge of club



ORNATE CHALCEDONY KNIFE

The handle of this sacrificial knife represents an eagle warrior, one of a prestigious order of Aztec fighting men. The knife blade is chalcedony, a type of quartz.

DATE c.1500
ORIGIN AZTEC EMPIRE
LENGTH 12½ IN (31.7 CM)



Mosaic inlay of turquoise, shell, and malachite

Jaguar skin covering

Decorative feather bands

Wooden handle carved into shape of crouching figure

Stone blade made of chalcedony



Stone flake

FULL VIEW



THROWING SPEAR

The Aztec's stone-edged spears were often launched by a throwing stick, or *atlatl*. This made them powerful weapons capable of causing severe injury—even to a fully armored Spanish soldier.

DATE c.1500
ORIGIN AZTEC EMPIRE

FULL VIEW



CHIMALLI (SHIELD)

An Aztec warrior's round shield, or *chimalli*, was highly decorated, partly to intimidate the enemy. The shield had a wooden or bamboo frame covered in feathers and skin. Shields were made by featherworkers, who also produced fans and headdresses.

DATE c.1500
ORIGIN AZTEC EMPIRE



ENEMY CAPTURE

This image from a Mexican codex shows an Aztec warrior taking an enemy fighter prisoner. The warrior carries a *chimalli* shield and wears a cumbersome feather-covered frame on his back, which marks him out as of officer status. The more captives a warrior took, the higher his status grew.

MAQUAHUITL (CLUB)

The principal close-quarters weapon was a wooden club with obsidian blades. Known as a *maquahuitl*, it was wielded like a sword, delivering a razor-sharp cut that could sever a horse's head.

DATE c.1500
ORIGIN AZTEC EMPIRE
LENGTH 29½ IN (75 CM)

Feather tassels





SPANISH CONQUESTS

The war in Mexico between the Aztecs and the plate-armor-clad Spanish conquistadors in the 16th century was fought with the shields and axes of a society that did not have steel, on one side, and the steel spears and swords of the Spanish on the other.



EUROPEAN HELMS AND BASINETS

THE SPANGENHELM WITH NASAL that had been worn by the Normans was replaced at the end of the 12th century with a rounder helmet, which eventually covered the entire face, and evolved into the great helm. Although providing good protection, the great helm was cumbersome, making it hard for the wearer to turn and see clearly. During the 14th century, it was largely relegated to a tournament role, being superseded by the basinet, a helmet that provided a good compromise between protection, mobility, and visibility.

Holes for
vervelles



GREAT BASINET

The origins of the basinet helmet go back to the metal skull cap worn inside a mail coif and under a great helm. In the case of the basinet, the skull cap extended to protect the side and back of the head. This basinet has no visor, but the holes for the velverles that secured the mail aventail are visible.

DATE c.1370

ORIGIN NORTHERN ITALY

WEIGHT 6¾ LB (3 KG)

Pointed crown

Rounded
skull



GREAT HELM

This great helm is constructed from three plates of steel, with a pointed crown and skull to deflect blows. The vision slits, or "sights" are formed between the skull and side plates, and the lower part of the helm is pierced by numerous ventilation holes called breaths.

DATE c.1350

ORIGIN ENGLAND

WEIGHT 5½ LB (2.5 KG)

Cross-shaped openings
for toggle-ended chain to
secure helm to breastplate

Iron plates,
originally
covered in gilt
copper sheet

Triangular
plates riveted
together



SEGMENTED HELM

This segmented helm dates back to the 11th century and is constructed from four triangular iron plates, originally covered in gilt copper sheet, and joined by copper rivets.

DATE 11TH CENTURY

ORIGIN POLAND

WEIGHT 6¾ LB (3 KG)

Copper rivets
with silver-
bound heads

Vervelle



"Ogival" skull (like pointed arch)

Hinge and pivot

Removable pin to allow visor to be taken off

Narrow sights

Rows of breathing holes (or "breaths")

Conical visor

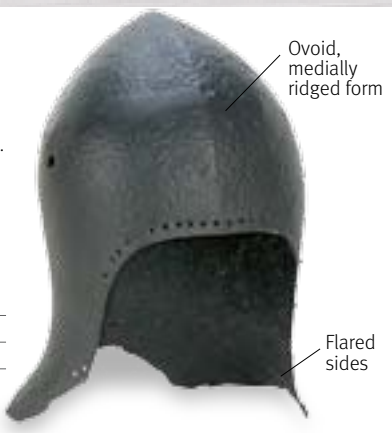
Brass borders decorated with "wriggled" cable pattern

Mail aventail

GREAT BASINET

This skull from a great basinet shows how the helmet sides extend further down than was the case with a standard basinet. Over time the mail aventail was replaced by a bevor and gorget plates. This helmet comes from the Yorkshire tomb of Sir John Melsa in the UK.

DATE LATE 14TH CENTURY
ORIGIN UK
WEIGHT 6¾ LB (3.06 KG)



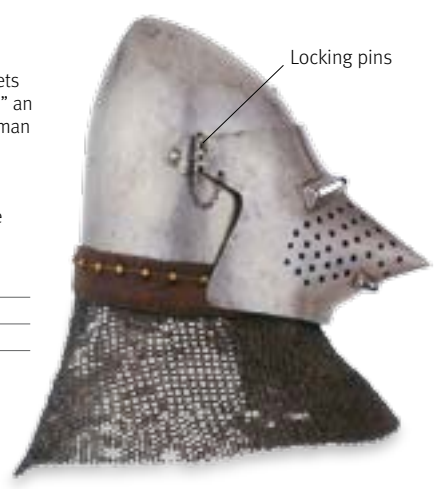
Ovoid, medially ridged form

Flared sides

HOUNSKULL BASINET

The distinctive pointed visors found on many basinet helmets were nicknamed "hounskulls," an English corruption of the German *hundsgugel* ("dog head"). The whole visor could easily be removed by withdrawing the locking pins—shown here tethered by a chain.

DATE 1350–1400
ORIGIN ITALY
WEIGHT 15½ LB (7 KG)



Locking pins

BASINET AND AVENTAIL

This hounskull basinet with an ogival skull is typical of that worn by knights throughout Europe in the middle-to-late 14th century. The mail collar or aventail has a leather band on the upper edge with holes that fit onto the brass vervelles that border the helmet's rim. A small hole has been drilled into each vervelle, through which a piece of string is drawn, attaching the vervelle to the basinet.

DATE 1350–1400
ORIGIN NORTHERN ITALY
WEIGHT 15¾ LB (7.12 KG)



FULL VIEW

EUROPEAN JOUSTING HELMS, BARBUTES, AND SALLETS

THE GREAT HELM—relegated to the jousting field in the mid-14th century—evolved into the frog-mouthed helmet, a piece of armor ideally suited to jousting. During the 15th century the basinet was superseded by a range of newer designs, of which the sallet was the most popular. Toward the end of the century, northern Italy and southern Germany began to take a lead in armor development that other countries followed. Italian armor was rounded in style, while the German or Gothic style featured decoration in the form of radiating patterns of lines and ridges over the entire harness of armor.

Rounded skull

Rivet to join metal plates together

FROG-MOUTHED HELM

The frog-mouthed helm provided the jousting knight with basic straight-ahead vision and maximum protection at the point of impact. He would lean his head forward at the commencement of the charge to look out of the vision slit or sight, but the moment before the lances clashed he would swiftly lift his head up to deny his opponent any opportunity to thrust his lance into the sight.

DATE EARLY 15TH CENTURY

ORIGIN ENGLAND

WEIGHT 22 LB (10 KG)

Helmet collar

JOUSTING HELM

The frog-mouthed jousting helm would sit squarely on the knight's cuirass, and, in the case of this example, have steel attachments to lock it firmly to breast- and backplates. The forward part of the helmet was specifically designed to deflect the opponent's lance.

DATE c.1480

ORIGIN SOUTHERN GERMANY

WEIGHT 22½ LB (10.2 KG)

Sight or vision slit



JOUSTING HELM

The construction of a frog-mouthed jousting helm is fairly straightforward because it consists of just two pieces of steel: the first sits on the skull while the second is wrapped around the whole head, coming to a rounded point at the front of the face. A series of prominent rivets join the edges together.

DATE 15TH CENTURY

ORIGIN EUROPE

WEIGHT 16¼ LB (7.4 KG)



BARBUTE

The barbute (or barbuta) is a close-fitting, shoulder-length helmet, and many have a T-shaped opening for the face. This example also has a nasal, and because of its similarity to the helmets of classical Greece, it is known as a "Corinthian" barbute. The helmet was usually worn by infantry and was in use throughout the 15th century.

DATE c.1445

ORIGIN ITALY

WEIGHT 5¾ LB (2.67 KG)

Tail of sallet helmet to protect neck



SHORT-TAILED SALLET

Originating in Italy, the sallet was a helmet adopted by all classes of fighting men in 15th-century Europe, worn either with or without a visor. This visorless helmet is closely shaped to the head and has a tail considerably shorter than most other sallets.

DATE c.1440

ORIGIN NORTHERN ITALY

WEIGHT 3¼ LB (1.48 KG)

Frog-mouthed sight

LONG-TAILED SALLET

This helmet is fairly typical of German sallets toward the end of the 15th century, featuring a long sweeping tail to protect the neck, as well as a visor with a single sight. For knights and men-at-arms, sallets would normally be worn with a bevor to protect the throat, chin, and lower face.

DATE 1480–1510

ORIGIN GERMANY

WEIGHT 5¾ LB (2.6 KG)



Visor with single sight

Flame pattern on skull



PAINTED SALLET

It was not uncommon for sallets to be covered in cloth or leather, or have heraldic designs painted on them. This sallet has numerous pairs of small holes to attach a fabric covering, and is painted with a checkered design in red, white, and green, on the visor and lower part.

DATE 1490

ORIGIN GERMANY

WEIGHT 5 LB (2.2 KG)

Visor with double sights

Geometric design with star and portcullis motifs

MEDIEVAL KNIGHT

THE ARMORED KNIGHT was the elite fighting man of medieval Europe. With his horse, armor, lance, and sword, he was both a costly warrior and a figure with high cultural and social prestige. Although warfare rarely lived up to the ideal of mounted nobles clashing in chivalrous combat, knights were highly skilled soldiers who adapted well to the constantly evolving challenges of the medieval battlefield.

WITH SWORD AND LANCE

Medieval society expected any young male of social standing to seek glory in war. Training was taken very seriously. Boys served first as pages and then as squires in the household of a knight who ensured their education in horsemanship and the use of the sword and lance. After graduation to knighthood, training continued through tournaments that honed fighting skills, and through more or less constant warfare. If there was no fighting to be had close to home, knights would seek it out, traveling to the edges of the Christian world to fight the “infidels.” The classic form of knightly combat was the charge with couched lance on horseback. But knights were also effective on foot, wielding swords, maces, or battle-axes. The code of chivalry to which knights subscribed expressed a Christian ethic of warfare, but in practice the plundering, skirmishing, and sieges of medieval warfare left little place for idealism. In the relatively rare pitched battles, knights were sometimes routed by disciplined foot soldiers or bowmen, but they remained a dominant force into the 16th century.

TEMPLARS

In the 12th century, knights of the Christian kingdoms in Palestine formed military monastic orders such as the Knights Templar. Obeying austere religious rules, these fighting monks became elite forces dedicated to the struggle against Islam. Named after the Temple in Jerusalem where they had their headquarters, the Templars accumulated wealth that attracted the envy of kings. The order was condemned for alleged heresy and suppressed in 1312.

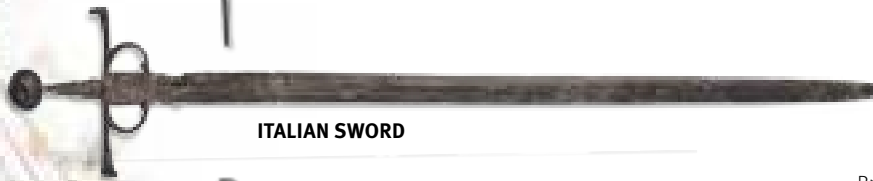
**TEMPLAR KNIGHT
READY FOR BATTLE**



TOOLS OF COMBAT



HAND-AND-A-HALF SWORD



ITALIAN SWORD



IRON QUILLON DAGGER



QUILLON DAGGER

MAIL-CLAD KNIGHTS

Mounted knights in mail and emblazoned cloth surcoats with heraldic designs wield their swords in a melee. Close grappling was a significant element in knightly fighting skills.

BATTLE OF CRÉCY

Fought in August 1346, Crécy was one of the encounters that questioned knights' dominance on the battlefield. Although French and English knights did engage with lance and sword, the flower of French chivalry was mown down by Welsh longbowmen.



PLATE ARMOUR

The full steel plate armor worn by knights in the 15th century offered excellent protection. The helmet was curved to deflect the impact of a mace blow, and slashing sword strokes would have no effect. The knight was only vulnerable to steel crossbows and firearms. This "Gothic" armor, with its elaborate decorative detail, was made in Germany.



“WHAT IS THE FUNCTION OF KNIGHTS? TO GUARD THE CHURCH, TO FIGHT UNBELIEVERS ... AND IF NEED BE, TO LAY DOWN THEIR LIVES.”

JOHN OF SALISBURY, *POLICRATICUS*, 1159

EUROPEAN MAIL ARMOR

MAIL ARMOR—the linking together of small iron or steel rings to form a mesh—dates back as far as the 5th century BCE. By the time of the Norman Conquest of England in 1066, three-quarter length mail armor was common among knights and, by the 13th century, it was being worn from head to toe. Construction was a slow and laborious process, and as many as 30,000 separate links were required for a single shirt of mail.

MAIL HAUBERK

The hauberk or byrnie—a knee-length shirt of mail—was the central item of armor for 11th- and 12th-century knights and men-at-arms. To guard against blunt trauma blows to the body, the knight would wear a padded garment called a gambeson underneath his hauberk.

DATE 20TH-CENTURY REPLICA

ORIGIN EUROPE



FULL VIEW

MAIL COIF

Although some suits of mail armor included an integral hood with the hauberk, others had a separate hood, or coif, to be worn under a plate helmet. Mail was usually constructed from wrought iron, although mild steel was used on occasion.

DATE 20TH-CENTURY REPLICA

ORIGIN EUROPE

Horseman's slit to allow freedom of movement while on horseback

Mail flap to be drawn across face while in combat

Short sleeves for mobility

Welded iron rings

Anglo Saxon-style square neck



MAIL SHIRT

This mail shirt—called a "haubergeon"—has been made in the Asian style. All the rings have been welded together, whereas in the west, the common practice was for mail to be made of alternate lines of welded and riveted rings.

DATE 20TH-CENTURY REPLICA

ORIGIN EUROPE



THE BATTLE OF BOUVINES

This contemporary illustration of the battle of Bouvines in 1214 —where an English army and its allies were defeated by the French—shows both cavalry and foot soldiers wearing full suits of mail armor.

Alternate rows of solid and riveted links



MAIL DETAIL

Mail was usually connected by the four-to-one system, where each ring was linked to four other rings. In Europe the most common practice was for mail to be made from alternate rows of welded and riveted rings, and from the 14th century onward, entirely from riveted rings.

Cuffs bordered by brass links

MAIL SHIRT AND AVENTAIL

This full-sleeved hauberk and aventail—the mail collar hanging directly from the helmet—is thought to have belonged to Rudolf IV, the Habsburg Duke of Austria. Although plate armor was becoming common in this period, mail was still in demand in Europe for another 100 years.

DATE	MID-14TH CENTURY
ORIGIN	AUSTRIA
WEIGHT	30½ LB (13.83 KG)



Replica basinet helmet

Mail aventail attached to basinet

Mail hauberk reaching to knees

EUROPEAN PLATE ARMOR

DURING THE 14TH CENTURY mail armor was increasingly supplemented by plate armor, which was surprisingly flexible and provided its wearer with a good deal of mobility. By the middle of the 15th century, knights were equipped with complete suits of plate armor with mail relegated to covering exposed areas behind the armor joints. During the late 15th and early 16th centuries, plate armor reached its apogee, and the main elements are revealed in this breakdown of a mid-16th-century Italian suit of armor.

ITALIAN ARMOR

The close helm tightly encloses the entire head. Its pivoted visor is divided into two parts: the visor proper and the upper bevor. The cuirass, covering the torso, consists of a breastplate linked to a backplate (not shown) by leather straps. Extending from the breastplate are skirts and tassets to guard the abdomen and upper thighs. Neck, arm, and leg defenses complete the head-to-toe protection.

DATE MID-16TH CENTURY
ORIGIN ITALY



Longitudinal comb

Lifting peg to raise visor

Eye slit in visor

Gorget—to protect neck and join helmet to cuirass

Leather straps connecting breast- and backplates

Breathing vents

Upper bevor in raised position

Breastplate to protect chest

BREASTPLATE SECTION OF CUIRASS

Articulated steel tasset plates to aid mobility at the waist

CLOSE HELM

Lower bevor

Hinge and pivot

Hook to attach upper and lower bevors

Gorget plates to overlap gorget



GORGET



Pauldron to protect shoulder

PAULDRONS

Scrolling decoration



Rerebrace to protect arm



Raised neck and armpit edge for deflecting swords and staff weapons.

Skirt

Strap for buckling skirt to tassets

THIGH PLATES OF CUIRASS

Rivet connecting tassets



Leather straps and buckles to attach to leg

CUISSES



Cuisse to protect thigh

Poleyn to protect knee

Couter to protect elbow



One plate, the cuff, covers wrist

MITTEN GAUNTLET

Articulated steel plates



Thumb plate

MITTEN GAUNTLET



GREAVES

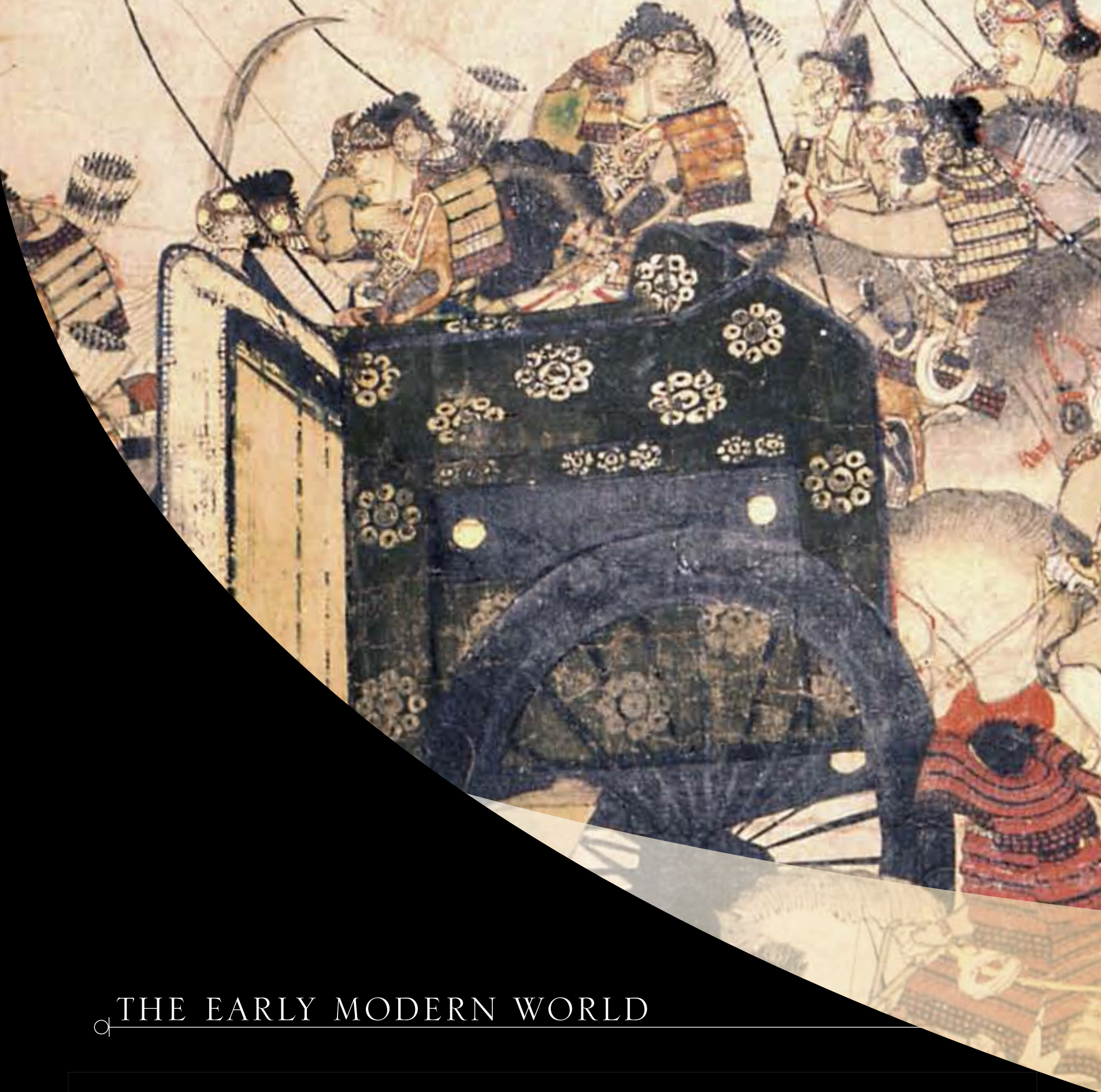
Greaves to protect lower leg



Hook for closing greave

Sabaton to protect foot —made from small overlapping plates

SABATON



THE EARLY MODERN WORLD





The 16th and 17th centuries saw the rapid spread of firearms, both within and outside Europe, and the modification of military and political strategy to cope with the effects of the new technology. A world in which elites were not born to military service, but rather trained and drilled to it, coupled with a generalized growth in the capacity of states both to raise taxes and—to a lesser extent—to direct their expenditure effectively, meant that armies, as well as the weapons they deployed, became ever more lethal.



OPEN FIGHTING

At Pavia (1525), the combat was decided by imperial arquebusiers and pikemen fighting in the open, unshielded by entrenchment; the French Army was decimated and their king, François I, was captured by Charles V, the Holy Roman Emperor.

BY THE EARLY 16TH CENTURY, artillery had clearly demonstrated its effectiveness. This was underlined by developments such as the introduction of the trunnion—horizontally projecting lugs that allowed guns to be elevated or depressed more effectively. For a short period, the late medieval propensity to skulk behind powerful fortifications and for campaigns to focus on sieges and raids was replaced by a phase during which armies, aware that they could no longer defend fixed points, were much more willing to risk pitched battles.

SIEGE WARFARE

The Italian Wars (1494–1509) saw the first large-scale demonstrations of the potency of field artillery and firearms on the battlefield. At Cerignola (1503), the Spanish fought from shelter behind a trench and earth parapet, subjecting the French cavalry to withering fire. At the battle of Ravenna (1512), the combat opened with a two-hour artillery duel, the first of these ever to be recorded. This era of open warfare, however, was soon replaced by a long period in which sieges became once more the dominant feature in campaigns. The spread of *trace italienne* fortifications (see box page 100) meant that sieges became prolonged and costly affairs and the benefits to a defending army of remaining safe within city walls more obvious.

The arquebus was a primitive firearm that was widely used from the 15th–17th centuries. Around the 1520s a new weapon appeared—the musket. Weighing up to 20 lb (9 kg)—much heavier than the arquebus—it required a forked rest to allow its bearer to fire, but did have the advantage of delivering a ball with much greater force. The musket's unwieldiness meant it was most effective in sieges. The advent of gunpowder weapons did not, at a stroke, make infantry stalwarts such as the pike obsolete. Swiss pike formations were a common feature of early 16th century battles, and their aggressive tactics, such as charging entrenched arquebusiers at Novara (1513), made them



rightly feared. The proportions of pikemen in armies steadily declined, however, to as little as one in five by the mid-17th century.

The retention of the pike was one aspect of a self-conscious tendency in European armies for military theorists (as much as Renaissance architects) to draw on ancient classical models, such as the spear-wielding Greek hoplites or the disciplined ranks of the Roman army, for their own campaigns. In 1534 Francois I of France established seven *companies d'ordonnance*, each 6,000-strong, modeled on the Roman legions, while Italian theorists promoted a standard infantry company of 256, drawn up in a 16 by 16 square.

EUROPE'S GROWING ARMIES

The Italian poet Fulvio Testi wrote in the 1640s, "This is the century of the soldier," in reference both to the increased bloodiness of battles—at Ceresole in 1544, some 7,000 of the 25,000 combatants perished—and to the sheer size of armies. That of Charles the Bold of Burgundy had been regarded as large in the 1470s at 15,000, a number dwarfed by Philip II of Spain's 86,000-strong army in the Netherlands a century later. The huge expense of refortifying towns and raising ever-larger armies put enormous strain on the leading powers in Europe.

European wars had, until the late 15th century, been fought principally for dynastic reasons, but the Protestant Reformation in the early 16th century added a religious and ideological dimension to warfare. By the 1560s, both France and the Netherlands had descended into religious civil war. The French Wars of Religion ended in 1589, but the revolt of the Netherlands was more protracted—ending only in 1648—and saw the resources of the Habsburgs under Charles V and then Philip II stretched to the limit. It also became the crucible of significant developments in military strategy.

The use of firepower brought about a change in battlefield formation as it was most effectively delivered in a line of battle, rather

than a traditional block. Throughout the 16th and 17th centuries, the ranks of armies thinned out and their lines extended. Fighting in line formation, however, required greater discipline—especially as opposing armies often opened fire at a range of only 164 ft (50 m). The Dutch Protestant leader Maurice of Nassau began to introduce his troops to "exercises" in the 1590s, drilling them and instructing them in basic maneuvers. His brother William Louis pioneered a system whereby consecutive rows of musketeers fired in turn, then retired to reload, allowing for continuous fire.

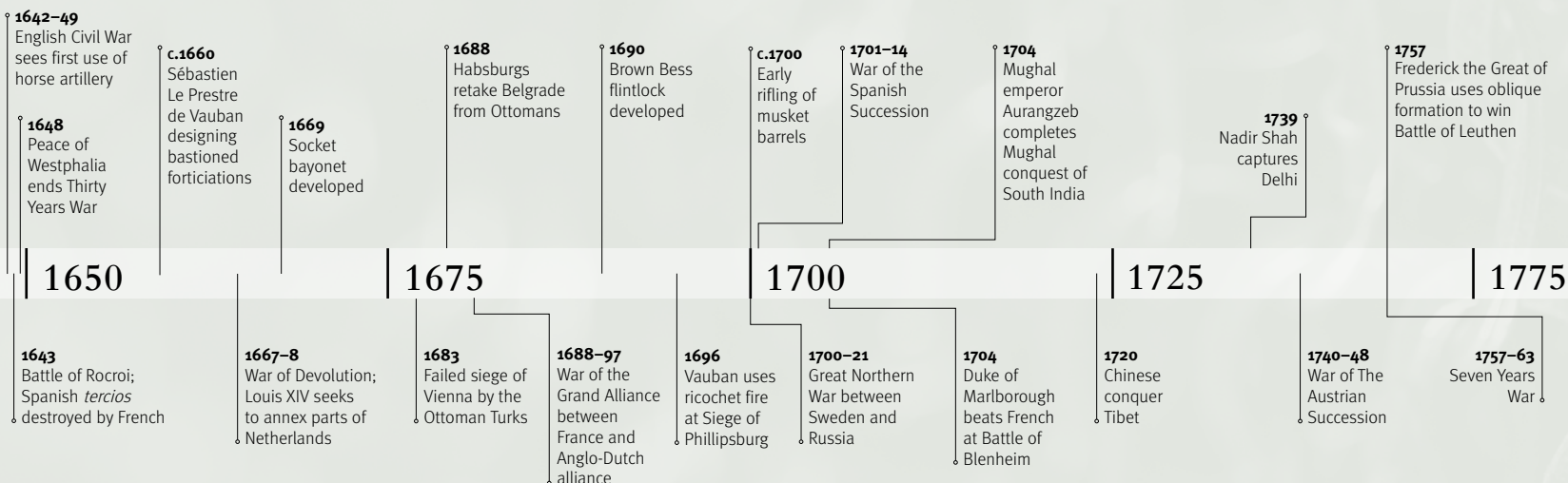
THE OLD WORLD MEETS THE NEW WORLD

The 16th century saw the first really successful projection of European power overseas. In the Americas, the Spanish confronted the Inca and Aztec empires, neither of which had developed iron. Wooden clubs and stone axes could not penetrate Spanish cuirasses, and only the Aztecs' copper-tipped arrow made

SPANISH SQUARES

The Spanish were among the first to mingle pikemen and arquebusiers into a mixed square known as a *tercio*, several of which are shown here in combat during the Eighty Years War (1568–1648) against the Dutch.

much impact against their enemies. At the siege of Cuzco in 1536, 190 Spanish soldiers defeated up to 200,000 Inca warriors armed largely with stones. The Spanish benefited from divisions among their enemies as much as from their technology. In Mexico they harnessed the antipathy of the Tlaxcala toward the Aztecs to obtain intelligence, while in Peru they exploited a civil war between two rival claimants to the Inca throne. Yet indigenous peoples learned fast. In North America the Massachusetts Indians were manufacturing shot by the 1670s, so that, whereas in earlier encounters there were few European casualties, in King Philip's War in 1675–76 there were 3,000 English wounded.



**MUSKET DRILL**

The musket was a complex weapon, requiring as many as 20 separate movements to ensure correct firing. Drill manuals illustrating the correct positions, such as this mid-17th century Dutch version, became an essential military accoutrement.

THE DEVELOPMENT OF GUNPOWDER

Against the Asian powers of Ottoman Turkey, Mughal India, Tokugawa Japan, and Ming and Qing China, military inroads by Europeans were relatively minor. Until their defeat at the second siege of Vienna (1683), the Ottomans pressed hard, engaging in constant small-scale warfare with the Austrian Habsburgs. The janissary infantry corps that had brought the Turks such great successes in the 16th century were beginning to atrophy as a military power, but they still possessed a light cavalry arm unmatched in Europe.

Although the Chinese had developed gunpowder earlier, Europe had opened up a technological lead by the 16th century. The Chinese then acquired Portuguese cannons in the 1520s, but were not content with merely aping the foreign technology. During the 16th century, they developed a “continuous bullet gun,” a primitive form of machine gun. A military manual of 1598 set out the precise measurement of gun barrels to tiny fractions of inches, while Chinese guns were stamped with serial numbers, indicating tight central control on production.

In Japan, the Onin Wars of 1467–76 had set in train a period of political fragmentation when local warlords, the *daimyo*, built up independent domains. Japan acquired firearms in 1542—from Portuguese passengers on a pirate ship that blew off course—and they

spread rapidly. Units of musketeers (*teppotai*) played a crucial role in the unification of Japan under Oda Nobunaga, who captured the royal capital of Kyoto in 1568 and conquered most of Japan before his death in 1582.

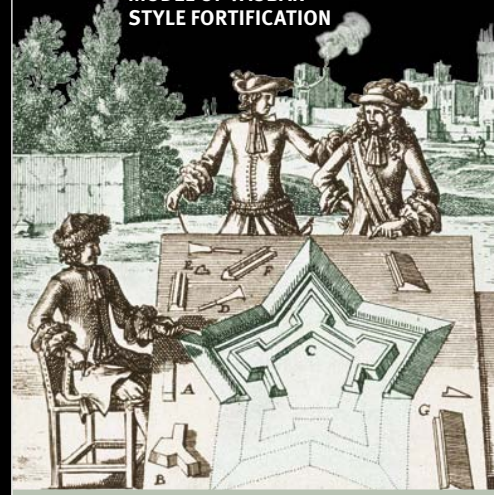
Battles in Japan at this time became more similar to the pitched encounters of European armies than the challenge and counter-challenge of elite samurai warriors that characterized earlier warfare there. Japanese armies showed considerable technical and tactical ingenuity; at Osaka in 1576, Nobunaga had seven ships constructed, shielded by armed plates, which were armed with canons and muskets, creating a very early version of an ironclad; while at Nagashina in 1575, Nobunaga’s musketeers fired in ranks in rotation, some years before the practice became established in Europe. Yet the final unification of Japan under the Tokugawa after 1600 meant that military conflict, and with it the impetus for technical development, declined. Already in 1588, the “Sword-hunt Edict” had ordered the confiscation of all weapons held in private hands, including firearms, contributing to a demilitarization that would leave it ill-equipped to face western intruders in the 19th century.

THE THIRTY YEARS WAR

The Thirty Years War (1618–48), a complex struggle, that pitted the Catholic Habsburgs against a shifting coalition of mostly

FORTIFICATION

The development of new siege artillery led to a search for improved forms of military architecture. The solution was polygonal and angled bastions, which, when manned by arquebusiers, created interlocking fields of fire and a killing zone for attackers. From its origins in Italy, the new type of fortification became known as the *trace italienne*. New levels of sophistication were reached in the late 17th century by the French engineer Vauban, whose employment of concentric rings of outworks and exploitation of topography to maximize defensive firepower made fortresses such as Lille forbidding obstacles for besieging forces.

MODEL OF VAUBAN-STYLE FORTIFICATION

Protestant foes, saw a further evolution in the sophistication of armies and tactics. Increasingly armies wore uniforms, or at least some identifying colour – the Habsburgs favoured red, while their French enemies wore blue. The Swedish army under Gustavus Adolphus took the reforms further than most. Gustavus effectively introduced conscription with his 1620 “Ordinance of Military Personnel”, while a War Board was established to supervise military administration. The fruit of these

INDIAN BLADE

This 18th-century dagger, with a hilt in the form of a dragon, is known as a *bichiwa* or “kiss of the scorpion.” Shivaji, the 17th-century Indian guerrilla leader, used such a concealed blade to assassinate his opponent Afzal Khan.



improvements came in a string of spectacular Swedish battlefield successes. At Breitenfeld (1631) a Swedish army formed up in six ranks faced a Habsburg army drawn up in “squares” 30 deep and 50 wide and won a crushing victory, killing almost 8,000 of their opponents.

Throughout the Thirty Years War, states had been forced to rely on mercenaries for manpower. Military entrepreneurs had flourished, such as Albrecht von Wallenstein, who was able to offer the services of a force numbering 25,000-strong. But after the Peace of Westphalia (1648), countries increasingly established standing armies, which were not disbanded at the end of a campaign. France’s army reached 125,000 by 1659 (and around 400,000 by 1690), while even the tiny German state of Jülich-Berg maintained a permanent fighting force of 5,000.

By now, wars cost huge sums to fight; between 1679 and 1725, the Russian armed forces cost 60 percent of total revenue in peacetime, and nearly all of it in wartime. In Louis XIV’s France, the construction of a barrier of fortresses across the northeastern Frontier, many designed by Vauban (*see box*) was ruinously expensive—that at Ath took six years and five million livres to build. Campaigns once more centered on sieges—during the Nine Years War (1688–97) the French sought to push their frontier eastward, but the siege of just one fortress, Philippsburg, took two months.

USE OF THE MUSKET AND BAYONET

The late 17th century saw the final demise of the pike, and its replacement by the bayonet. The plug bayonet, which blocked the muzzle of the musket and needed to be removed for firing, did not catch on. However, in 1669 the socket bayonet was developed, which created no such impediment. By 1689 it was becoming standard issue for French infantry. The latter 17th century also saw the development of the flintlock musket, lighter than the matchlock and with double the rate of fire.

The introduction of pre-packaged cartridges, with the gunpowder charge already measured out, also increased the rate of fire (they became general issue in the French army by 1738).

THE BEGINNINGS OF GLOBAL WARFARE

For a time in the 17th century, armies had employed a cavalry tactic, known as “caracole,” where the cavalry, armed with wheellock pistols, would trot into range, let off a volley and then retreat. But the combination of flintlock and socket bayonet made the mounted arm especially vulnerable, and by the late 18th century, they made up only 16 percent of the French army, principally used against other cavalry or in pursuit of already broken infantry.

Toward the end of the period, however, the cavalry underwent a revival, as they largely abandoned their firearms and relied instead on the shock of rapid and decisive charges—the English general Marlborough’s cavalry squadrons played a key role in his victory at Blenheim (1704) during the Spanish War of Succession.

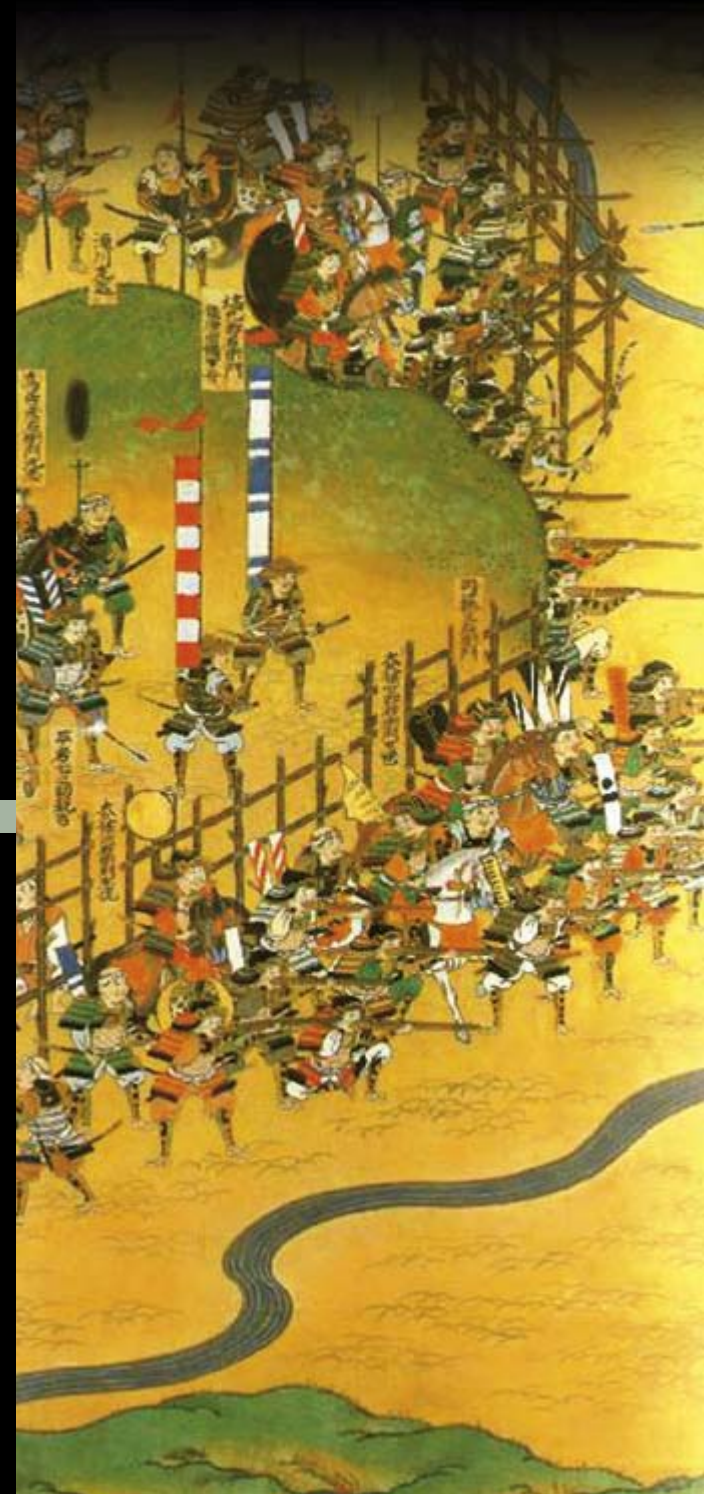
Prussia under Frederick the Great (1740–86) built up Europe’s most effective military force, founded on discipline and constant practice. Innovative tactics such as the oblique attack set a standard for other countries—the Russian Infantry Code of 1755 was firmly based on the Prussian model. During the Seven Years War (1756–63), the Prussians and their British allies faced a coalition of France, Austria, and Russia, intent on putting a stop to Prussian dominance of central Europe. This war is most notable, however, for being the first truly global conflict, as French and British rivalry played itself out across North America and the Indian subcontinent. From 1720 the Prussians had iron ramrods for their muskets, and could let off as many as three rounds a minute, fired on the move—a relatively new tactic—delivering Frederick successes such as Leuthen (1757), where some Prussian musketeers let off up to 180 rounds each.

As the 18th century progressed, field artillery became an increasingly vital component of armies. The French artillery train in Flanders in 1748 had no fewer than 150 cannon drawn by almost 3,000 horses. From 1739, barrels were cast in a single piece and then bored, allowing finer tolerances and more powerful pieces at a given size. With the establishment of gunnery schools, such as the French Royal Corps of Artillery in 1679, artillery officers were often some of the best trained in European armies. It is fitting, therefore, that it was to be a French artillery officer, Napoleon Bonaparte, who would finally bring an end to the ancient regime of the absolute monarchs and revolutionize warfare.



JAPANESE FIREARMS

At Nagashino in 1575, Oda Nobunaga’s ranks of arquebusiers fired rotating volleys to decimate the charge of his opponent Takeda Katsuyori. Those of Takeda’s horsemen who reached Oda’s lines were held off by pikes, in an echo of European tactics of the era.



TWO-HANDED SWORDS

DURING THE MIDDLE AGES, most infantry swords were relatively light and easy to wield, but by the late 15th century, a distinctive group of larger weapons grew in popularity, particularly in Germany. These two-handed (*doppelhänder*—double-hander or *beidenhände*—both-hander) swords were specialist weapons. The Landsknecht mercenaries who used them were called *doppelsöldner* and received double pay; but they earned it. They were expected to hack their way into enemy pike units. The impressive but clumsy weapons were also used for ceremonial duties and executions.



Spherical pommel

Double-edged blade shorter than German equivalent

HIGHLAND SWORD

The Scots developed their own tradition of “hand-and-a-half” weapons, derived from earlier medieval Scottish and Irish longswords. This Highland sword (*Claidheamh dà làimh*) has a blade just over 3 ft (1 m) long, and was shorter and lighter than German *doppelhänder* weapons. The forward-sloping quillons ending in quaterfoils were a common feature.

DATE	c.1550
ORIGIN	SCOTLAND
WEIGHT	5¾ LB (2.61 KG)
LENGTH	58¾ IN (1.5 M)

Flame or wave form of blade added for show

Grip bound in leather and pierced with metal studs

Forward-curving quillons terminate in curls

PARADE SWORD

In 16th- and early 17th-century Germany, particularly ornate two-handed swords such as this example were used on ceremonial occasions. These *paratschwerter* (parade swords, also called “bearing swords”) were longer and heavier than battlefield weapons, and often so ornate that they were of little use as offensive weapons. The flame form of the blade (*flammenschwert*) was impressive, but made little difference to its cutting qualities.

DATE	c.1580
ORIGIN	GERMANY
WEIGHT	7¼ LB (3.3 KG)
LENGTH	63 IN (1.6 M)

Scottish style of hilt

German blade

LOWLAND SWORD

Outwardly this sword is typical of the weapons used by German Landsknecht mercenaries on European battlefields during the early and mid-16th century. However, in this particular example, the blade is surmounted by a hilt produced in Scotland, and it is of typical Scottish design.

DATE	c.1570
ORIGIN	SCOTLAND
WEIGHT	6½ LB (2.95 KG)
LENGTH	58½ IN (1.48 M)

Parrying lugs reflect those on battlefield swords

Only one edge of the two sharpened

Good grip to help balance weight

TWO-HANDED SWORD

This *doppelhänder* sword was designed as a battlefield weapon, and is of a type used by the German Landsknecht. The sword has a blunt tip because it was designed to hack through enemy units rather than to pierce its victims.

DATE	c.1550
ORIGIN	GERMANY
WEIGHT	7 LB (3.18 KG)
LENGTH	55 IN (1.4 M)

Details and date of manufacture



RELIGIOUS BACKLASH

A German executioner prepares to behead a religious dissident with a two-handed sword. The bodies of earlier victims can be seen in the foreground. Mass executions and hangings of this kind were common during the Reformation (1517) and Counter-Reformation (1553).

A religious exhortation

Impalement by a spike

Impalement by a hook

Blade etched with scenes of executions

Beheading by executioner's sword

FRONT OF SWORD

BACK OF SWORD

Quillons are largely decorative

Bound, non-slip grip

Heavy pommel balances the weapon

Sword tip blunt and rounded

FULL VIEW

EXECUTION SWORD

This heavily ornate example of a municipal executioner's sword has a shorter hilt than earlier *doppelhänder* swords. Etched with depictions of gruesome executions, it was used for only one function. When not in use, the sword hung in a civic building as a deterrent to potential wrongdoers.

DATE	c.1674
ORIGIN	GERMANY
WEIGHT	4¾ LB (2.15 KG)
LENGTH	32¾ IN (0.83 M)

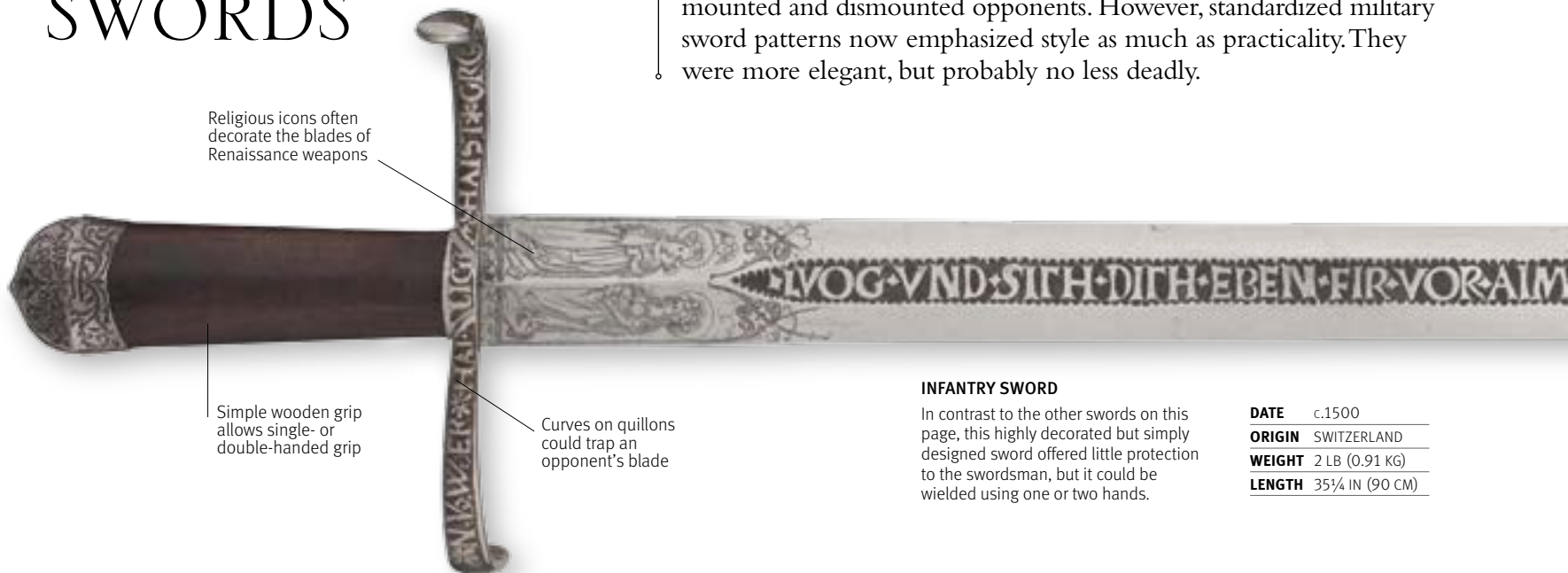
1500—1775

◀ 62–65 EUROPEAN SWORDS 1000–1500

▶ 180–183 EUROPEAN SWORDS 1775–1900

EUROPEAN INFANTRY AND CAVALRY SWORDS

WHILE THE MILITARY REVOLUTION that followed on the heels of the Renaissance meant that firepower was becoming increasingly important, the *arme blanche* (cold steel) still remained a battle-winning weapon, particularly for cavalry. Most infantry swords from the 16th century onward tended to be used as thrusting weapons, but cavalry still needed to slash downward at infantry, so they favored larger, double-edged swords that could be used equally well against mounted and dismounted opponents. However, standardized military sword patterns now emphasized style as much as practicality. They were more elegant, but probably no less deadly.



Religious icons often decorate the blades of Renaissance weapons

Simple wooden grip allows single- or double-handed grip

Curves on quillons could trap an opponent's blade

INFANTRY SWORD

In contrast to the other swords on this page, this highly decorated but simply designed sword offered little protection to the swordsman, but it could be wielded using one or two hands.

DATE	c.1500
ORIGIN	SWITZERLAND
WEIGHT	2 LB (0.91 KG)
LENGTH	35¼ IN (90 CM)

Blade was made a century after the hilt



FULL VIEW

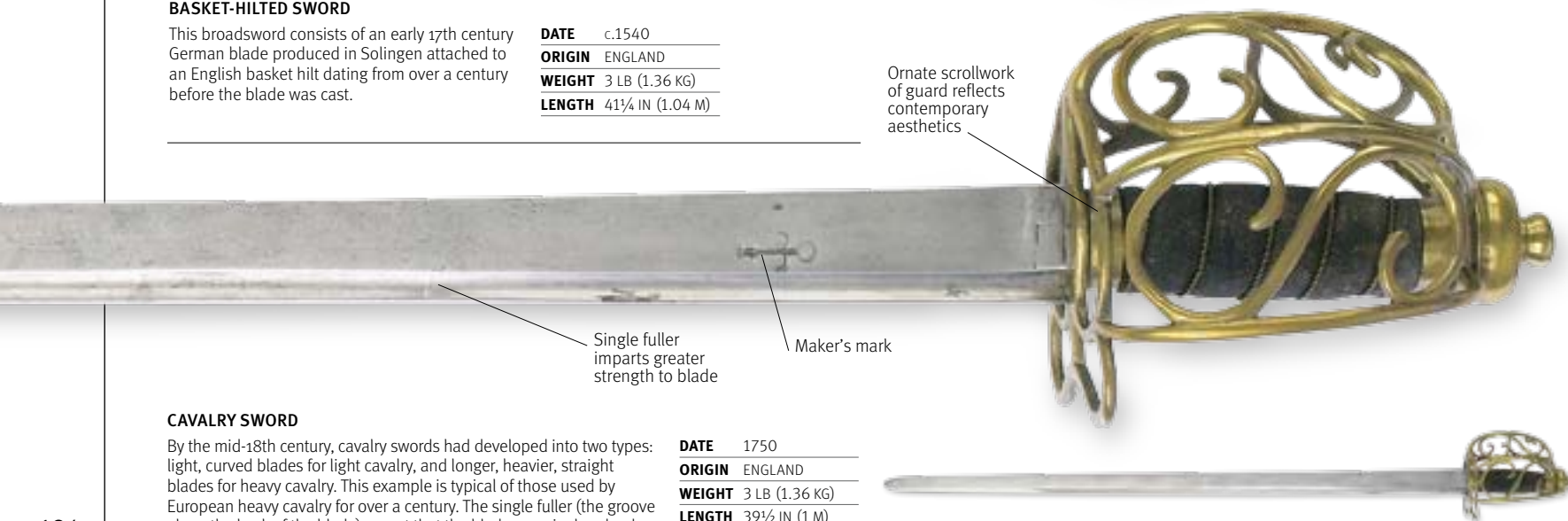
Silver-encrusted hilt

BASKET-HILTED SWORD

This broadsword consists of an early 17th century German blade produced in Solingen attached to an English basket hilt dating from over a century before the blade was cast.

DATE	c.1540
ORIGIN	ENGLAND
WEIGHT	3 LB (1.36 KG)
LENGTH	41¼ IN (1.04 M)

Ornate scrollwork of guard reflects contemporary aesthetics



Single fuller imparts greater strength to blade

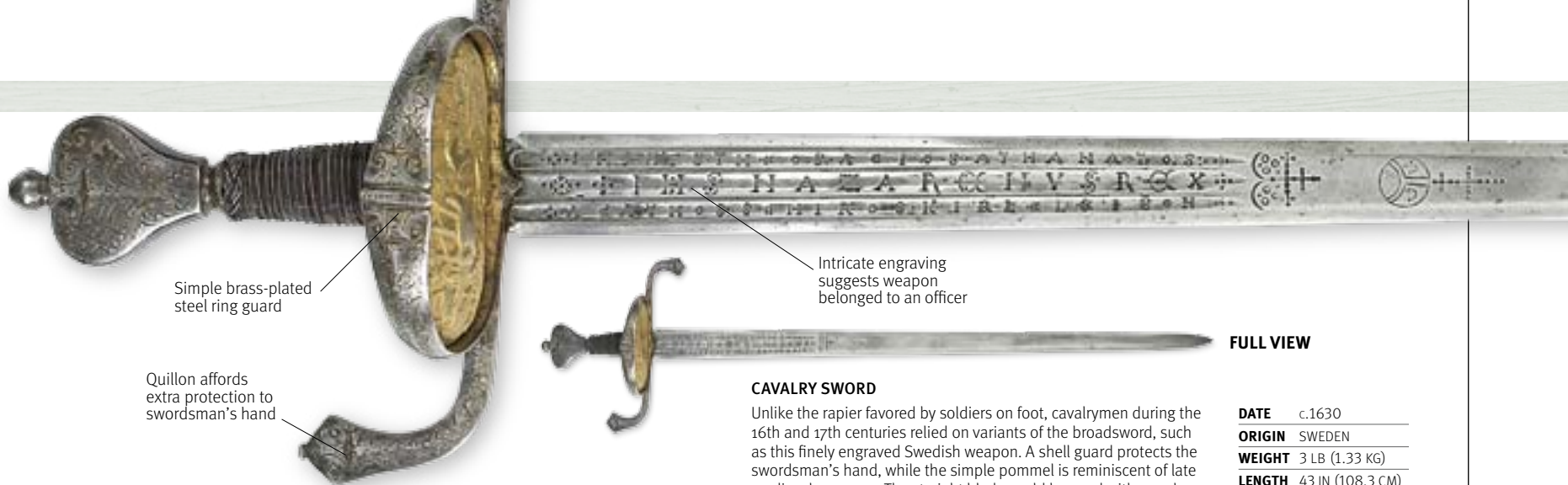
Maker's mark

FULL VIEW

CAVALRY SWORD

By the mid-18th century, cavalry swords had developed into two types: light, curved blades for light cavalry, and longer, heavier, straight blades for heavy cavalry. This example is typical of those used by European heavy cavalry for over a century. The single fuller (the groove along the back of the blade) meant that the blade was single-edged.

DATE	1750
ORIGIN	ENGLAND
WEIGHT	3 LB (1.36 KG)
LENGTH	39¼ IN (1 M)



Simple brass-plated steel ring guard

Quillon affords extra protection to swordsman's hand

Intricate engraving suggests weapon belonged to an officer

FULL VIEW

CAVALRY SWORD

Unlike the rapier favored by soldiers on foot, cavalymen during the 16th and 17th centuries relied on variants of the broadsword, such as this finely engraved Swedish weapon. A shell guard protects the swordsman's hand, while the simple pommel is reminiscent of late medieval weapons. The straight blade could be used with equal efficiency as a cutting or thrusting weapon.

DATE	c.1630
ORIGIN	SWEDEN
WEIGHT	3 LB (1.33 KG)
LENGTH	43 IN (108.3 CM)



Solid steel plates were often perforated with heart-shaped designs

Simple cut-steel shell guard encircles the whole hilt

Cut steel pommel larger than normal to provide weight for balance

Simple wooden grip

S-shaped quillon typical of weapons of this era

Blade lacks a fuller

Double-edged blade



FULL VIEW

DÜSACK

The *düsack* or *dussack* was primarily a South German and Austrian weapon of war. Its curved, saber-style blade made it a useful cutting weapon, while its enclosed guard offered good protection to the swordsman. Early 17th-century woodcuts support evidence that the *düsack* was also used as a dueling weapon in Southern Germany.

DATE	c.1570
ORIGIN	GERMANY
WEIGHT	3¼ LB (1.5 KG)
LENGTH	40 IN (1.02 M)



FULL VIEW

BROADSWORD

This proto-basket-hilt sword is an unusual composite of several sword types. It is described by its blade type. The cut-steel guard is basic, but represents a significant improvement over earlier Swiss weapons.

DATE	c.1550
ORIGIN	GERMANY
WEIGHT	3½ LB (1.59 KG)
LENGTH	37¾ IN (96 CM)

EUROPEAN INFANTRY AND CAVALRY SWORDS



DESTINY'S CHARGE

With sword in hand, King Gustavus Adolphus of Sweden led a cavalry charge against his protestant German foes during the Battle of Lützen (1632). He outpaced his bodyguard and found himself surrounded by enemy horsemen, who cut the Swedish king down without mercy.



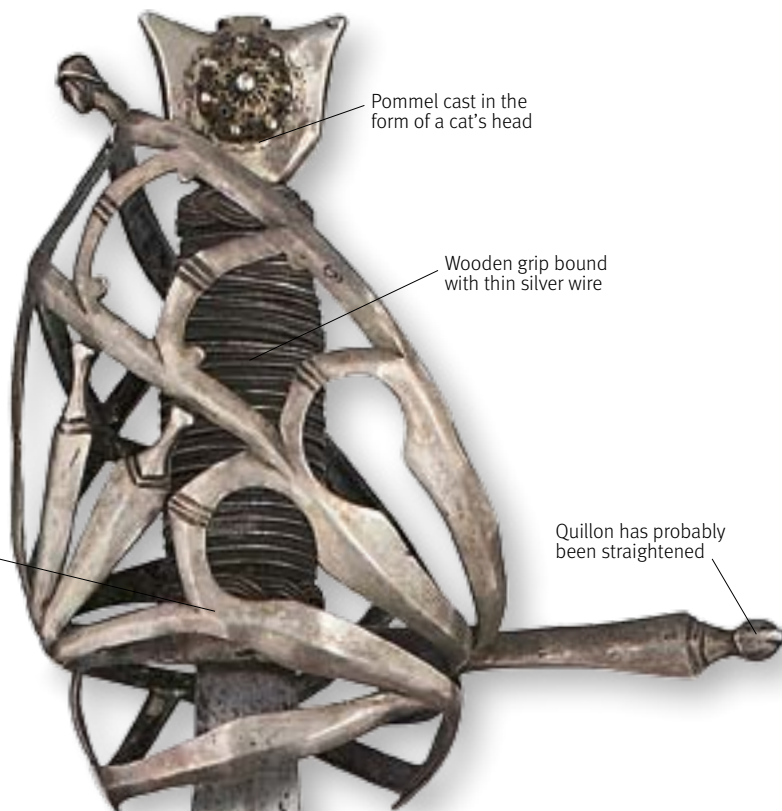
Pommel decorated with intricate inlaid brass scrollwork

Basket guard provides excellent protection

Inside of the basket lined with felt-covered leather

High-quality silverwork indicates this was possibly an officer's weapon

Wide double-sided blade good for cutting and thrusting



Pommel cast in the form of a cat's head

Wooden grip bound with thin silver wire

Quillon has probably been straightened



FULL VIEW

BROADSWORD

Although basket-hilted swords were used throughout Europe from the mid-16th century, they are most closely associated with the 18th-century Scottish Highlander. Most of these were made in the lowlands, principally in Glasgow and Stirling, although many of the blades were imported from Germany. The characteristically Scottish basket-hilt guard was designed to protect the swordsman's hand.

DATE	c.1750
ORIGIN	SCOTLAND
WEIGHT	3 LB (1.36 KG)
LENGTH	35¾ IN (91 CM)

Double-edged blade inscribed with the slogan *In Mene* ("in mind")

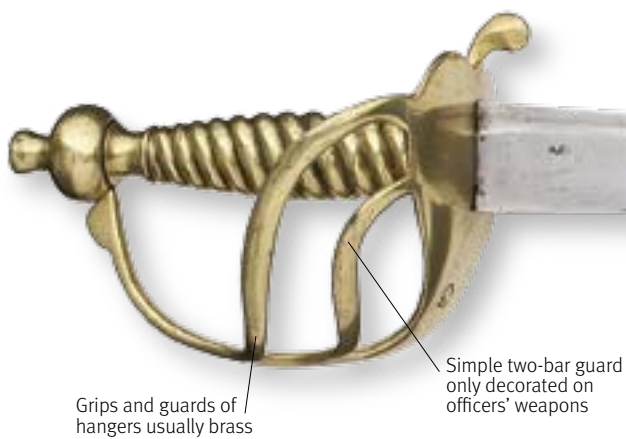


FULL VIEW

SCHIAVONA SWORD

This more delicate, characteristically Venetian example of a broadsword is known as a *schiavona*, meaning Slavonic. Schiavonas have a distinctive form of basket hilt, and almost always feature a pommel designed to resemble the head of a cat, an allusion to agility and stealth. They were primarily used by Dalmatian troops in the service of the Venetian Republic.

DATE	c.1780
ORIGIN	ITALY
WEIGHT	2¼ LB (1.02 KG)
LENGTH	41½ IN (1.05 M)



Grips and guards of hangers usually brass

Simple two-bar guard only decorated on officers' weapons



FULL VIEW

INFANTRY HANGER

While most infantrymen relied on the bayonet for combat, many foot troops were also issued with a "hanger," a crude military variant of a short hunting sword. This almost always has a straight or slightly curved blade. The hanger was more practical in difficult terrain than conventional longer swords.

DATE c.1760–1820
ORIGIN ENGLAND
WEIGHT 1¾ LB (0.84 KG)
LENGTH 31¼ IN (79.7 CM)

Single-edged blade is shorter than typical cavalry sword



Steel hilt decorated with simple cast scrollwork

Shape of guard usually described as a "half-basket hilt"



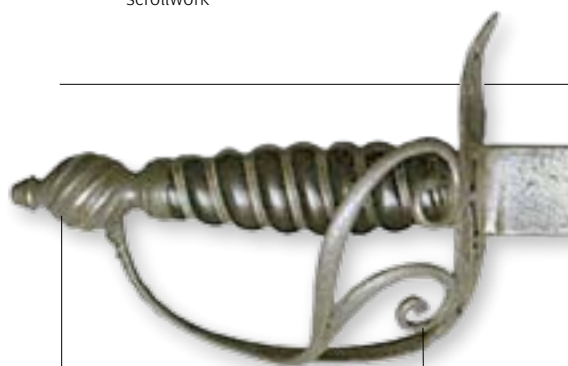
FULL VIEW

MORTUARY SWORD

So named because some examples bear an apparent chiseled likeness of Charles I on the hilt, these swords were widely used by cavalymen during the English Civil War that preceded the execution of the king in 1649. Although the blade was manufactured in Germany, the hilt of this weapon is of a uniquely English design.

DATE 1640–60
ORIGIN ENGLAND
WEIGHT 2 LB (0.91 KG)
LENGTH 36 IN (91 CM)

Double-edged blade with two fullers to reduce weight



Decoration on hilt shows sword belonged to an officer

Style of guard in contemporary rococo design



FULL VIEW

CAVALRY SWORD

This is typical of the single-edged swords carried by heavy cavalry for much of the 18th century. While cavalymen still cut with their swords, it was considered more practical for heavy cavalry to use the point of their sword instead of the edge. This weapon was dual purpose, without being particularly well suited for either type of swordplay. After 1780 most British Army swords were designed to set patterns.

DATE c.1775
ORIGIN ENGLAND
WEIGHT 1¾ LB (0.85 KG)
LENGTH 33 IN (83.8 CM)



Pommel can be used as a weapon

Intricate swept-hilt guard



FULL VIEW

SWEPT-HILT RAPIER

The classic infantry weapon of the 17th century was designed purely as a thrusting weapon, whereas swordplay "at the point" was considered the art of a gentleman. As well as a military weapon, the rapier was also regarded as the dueler's weapon of choice, until it was replaced by the pistol in the late 17th century.

DATE 1600–60
ORIGIN EUROPE
WEIGHT 2¾ LB (1.27 KG)
LENGTH 50 IN (1.27 M)

Dull edges

LANDSKNECHT

16TH-CENTURY
GERMAN
BROADSWORD

THE GARISHLY DRESSED, swaggering mercenary bands known as the Landsknecht were founded in 1486 by Holy Roman Emperor Maximilian I, who wanted his own infantry force to match the Swiss pikemen who had been victorious at the battles of Murten and Nancy in 1476–77. Officially, the Landsknecht were bound to serve the emperor, but the lure of pay and plunder soon led many of them to seek alternative employers. Feared and admired, they were a ubiquitous presence on European battlefields in the first half of the 16th century.

MERCENARY FIGHTERS

Individual mercenary captains were contracted to recruit, train, and organize regiments about 4,000 strong. The majority of recruits came from German-speaking areas, although some hailed from as far afield as Scotland. They were tempted by pay of four guilders a month, a good income for the time, but they had to supply their own equipment. Only the better off could afford full armor or an arquebus. The weapon of the majority was the pike,

15 or 20 ft (5 or 6 m) long, and costing around one guilder. The core of the Landsknecht battlefield formation was a phalanx of pikemen, supported by skirmishers armed with crossbows and arquebuses and, in the van, the regiment's best soldiers armed with two-handed swords. On the battlefield, the Landsknecht were disciplined and courageous but, when their wages were not paid, they gained a reputation for mutiny and plundering.

MOUNTED CAPTAIN

Distinguishable by the fineness of his clothes, a Landsknecht captain was a private entrepreneur, who employed his men and then sold their services to kings at a handsome profit.

Captain's
bodyguard

Halberd

Broad, flat,
beret-style hat
decorated with tall
feathers

Pike

Slash
and puff
clothing



BATTLE OF PAVIA

At Pavia in 1525, the Landsknecht Black Band, employed by French King François I, fought to the last man while the rest of the French forces fled the field.

GREAT WARRIORS

THE SACK OF ROME

In 1527, the Landsknecht and other imperial forces of Charles V, Holy Roman Emperor, occupied Rome. As Lutherans, the Landsknecht hated the Catholic Church. One Landsknecht recorded: “We put over 6,000 men to the sword, seized all that we could find in the churches, burned down a great part of the city ...”. The occupation lasted nine months, with the mercenaries refusing to leave until they had been paid arrears of wages.

IMPERIAL FORCES ENTERING ROME



“WE WERE 1,800 GERMANS AND WERE ATTACKED BY 15,000 SWEDISH PEASANTS ... WE STRUCK MOST OF THEM DEAD.”

LANDSKNECHT PAUL DOLSTEIN, ON FIGHTING FOR THE KING OF DENMARK, JULY 1502

TOOLS OF COMBAT



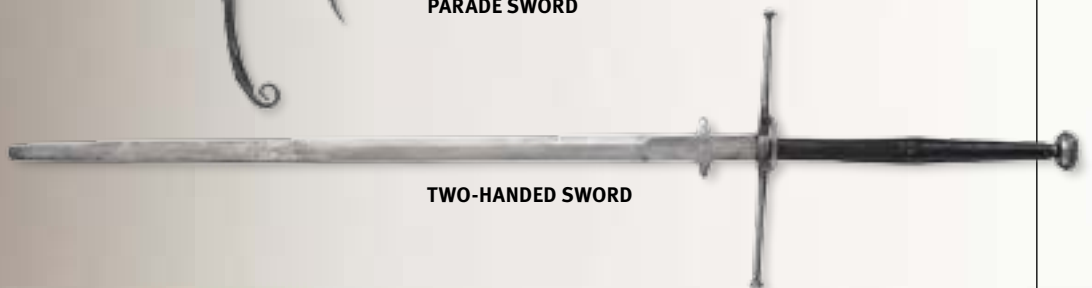
PIKE



HALBERD



PARADE SWORD



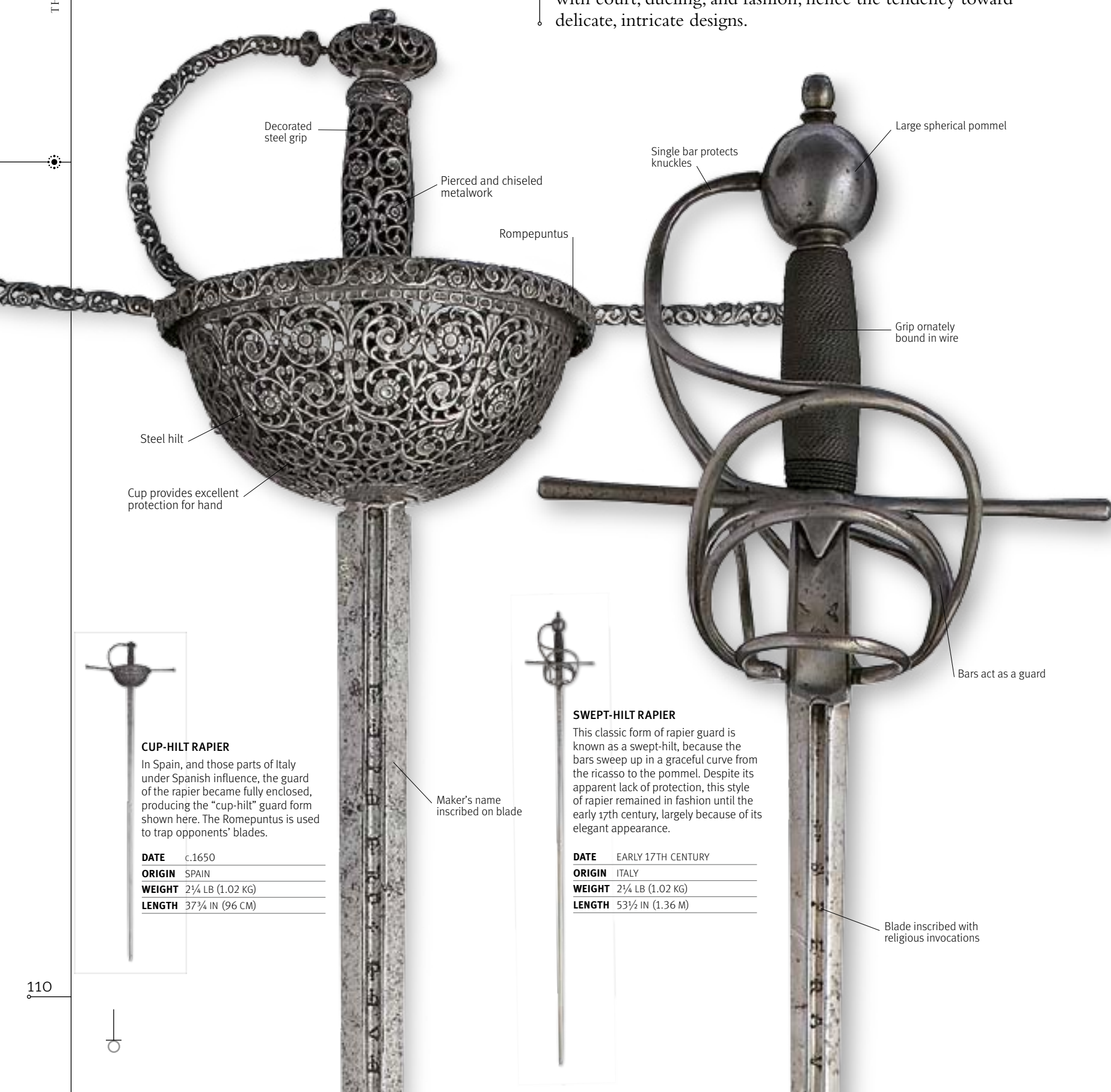
TWO-HANDED SWORD

DOUBLE-PAY MEN

These Landsknecht *doppelsöldener*, or “double-pay men,” earned their extra wages fighting in the front line. Wielding their two-handed swords, they assailed the ranks of enemy pikemen, opening up gaps in their formation. The bizarre outfits that the Landsknecht wore—extravagantly puffed and slashed, with assorted headgear—expressed an arrogant spirit that made them of doubtful loyalty to their employers, and a much-feared menace to civilians.

EUROPEAN RAPIERS

IN THE 16TH CENTURY, the rapier became the weapon of a gentleman; a symbol that he was a man of substance and status, and that he knew how to use his sword. The term is derived from the 15th-century Spanish term *espada ropera* (sword of the robes) meaning the weapon of a gentleman. By 1500 the rapier was used throughout Europe, and it would remain the premier gentleman's sword until the late 17th century. While it was certainly used on the battlefield, it is more readily associated with court, dueling, and fashion, hence the tendency toward delicate, intricate designs.



Decorated steel grip

Pierced and chiseled metalwork

Rompepuntas

Steel hilt

Cup provides excellent protection for hand

Single bar protects knuckles

Large spherical pommel

Grip ornately bound in wire

Bars act as a guard

Maker's name inscribed on blade

Blade inscribed with religious invocations

CUP-HILT RAPIER

In Spain, and those parts of Italy under Spanish influence, the guard of the rapier became fully enclosed, producing the "cup-hilt" guard form shown here. The *Rompepuntas* is used to trap opponents' blades.

DATE c.1650

ORIGIN SPAIN

WEIGHT 2¼ LB (1.02 KG)

LENGTH 37¾ IN (96 CM)

SWEPT-HILT RAPIER

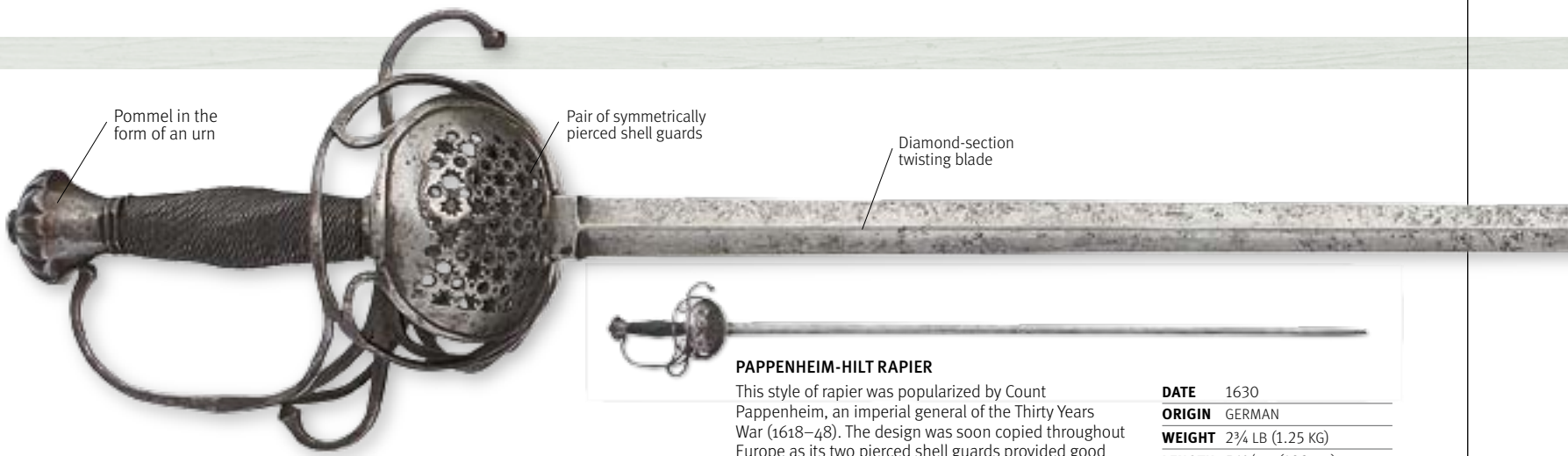
This classic form of rapier guard is known as a swept-hilt, because the bars sweep up in a graceful curve from the ricasso to the pommel. Despite its apparent lack of protection, this style of rapier remained in fashion until the early 17th century, largely because of its elegant appearance.

DATE EARLY 17TH CENTURY

ORIGIN ITALY

WEIGHT 2¼ LB (1.02 KG)

LENGTH 53½ IN (1.36 M)



Pommel in the form of an urn

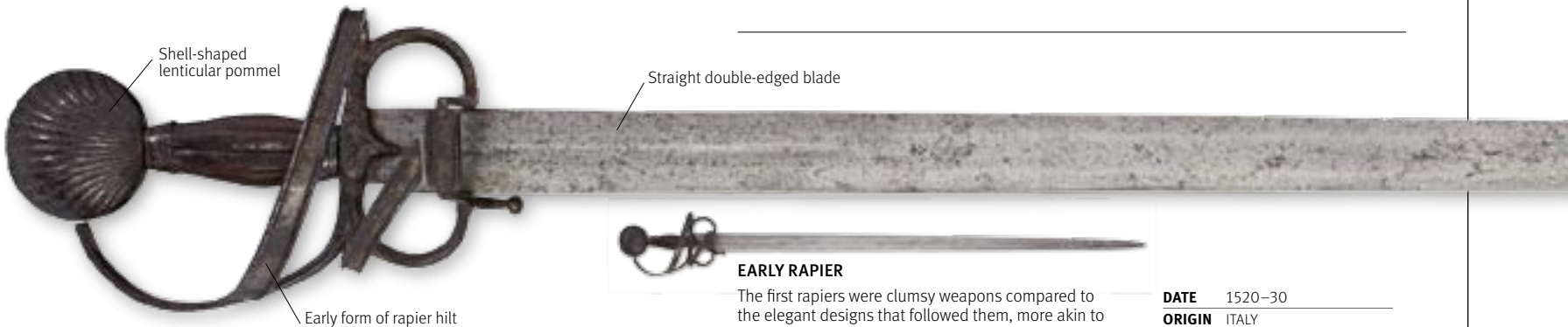
Pair of symmetrically pierced shell guards

Diamond-section twisting blade

PAPPENHEIM-HILT RAPIER

This style of rapier was popularized by Count Pappenheim, an imperial general of the Thirty Years War (1618–48). The design was soon copied throughout Europe as its two pierced shell guards provided good protection for the swordsman. The Pappenheim variant was designed for military use.

DATE	1630
ORIGIN	GERMAN
WEIGHT	2¾ LB (1.25 KG)
LENGTH	54¾ IN (139 CM)



Shell-shaped lenticular pommel

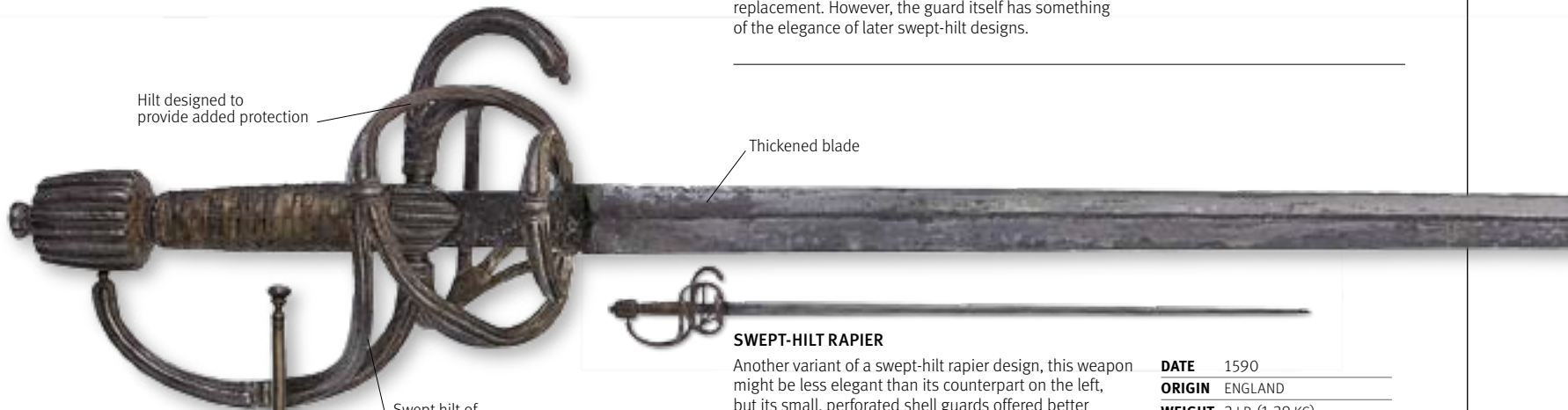
Straight double-edged blade

Early form of rapier hilt

EARLY RAPIER

The first rapiers were clumsy weapons compared to the elegant designs that followed them, more akin to contemporary military swords than weapons designed primarily for civilian wear. This example shows some reworking, which may suggest that the blade is a replacement. However, the guard itself has something of the elegance of later swept-hilt designs.

DATE	1520–30
ORIGIN	ITALY
WEIGHT	2¾ LB (1.21 KG)
LENGTH	44 IN (111.5 CM)



Hilt designed to provide added protection

Thickened blade

Swept hilt of chiselled iron

SWEPT-HILT RAPIER

Another variant of a swept-hilt rapier design, this weapon might be less elegant than its counterpart on the left, but its small, perforated shell guards offered better protection. In this example the grip is bound in woven wire. It suggests this rapier was made as a dress sword rather than for military use.

DATE	1590
ORIGIN	ENGLAND
WEIGHT	3 LB (1.39 KG)
LENGTH	50½ IN (128 CM)



Plain cup-hilt

Simple ricasso

Shallow diamond-section blade

Square-section blade

Circular stop-rib riveted to cup

CUP-HILT RAPIER

Unlike other rapiers, this later weapon was designed as a fencing piece rather than as a weapon that denoted gentlemanly status. It has an extremely narrow diamond-section blade, and a simple, unadorned cup and hilt.

DATE	c.1680
ORIGIN	ITALIAN
WEIGHT	2 LB (0.9 KG)
LENGTH	47 IN (119.8 CM)

EUROPEAN SMALLSWORDS

A DEVELOPMENT OF THE RAPIER, the smallsword came into general use in Western Europe toward the end of the 17th century. It was a civilian weapon: an essential item of dress for any gentleman that also acted as a dueling sword. Intended solely for thrusting, the smallsword typically had a stiff triangular blade, without sharpened edges, which in the hands of a skilful swordsman was a deadly fencing weapon. Although simple in overall design—the handguard consisting of a small cup, and finger and knuckle guards—many smallswords were magnificently decorated, reflecting the status of their owners.



FULL VIEW

ETCHED SWORD

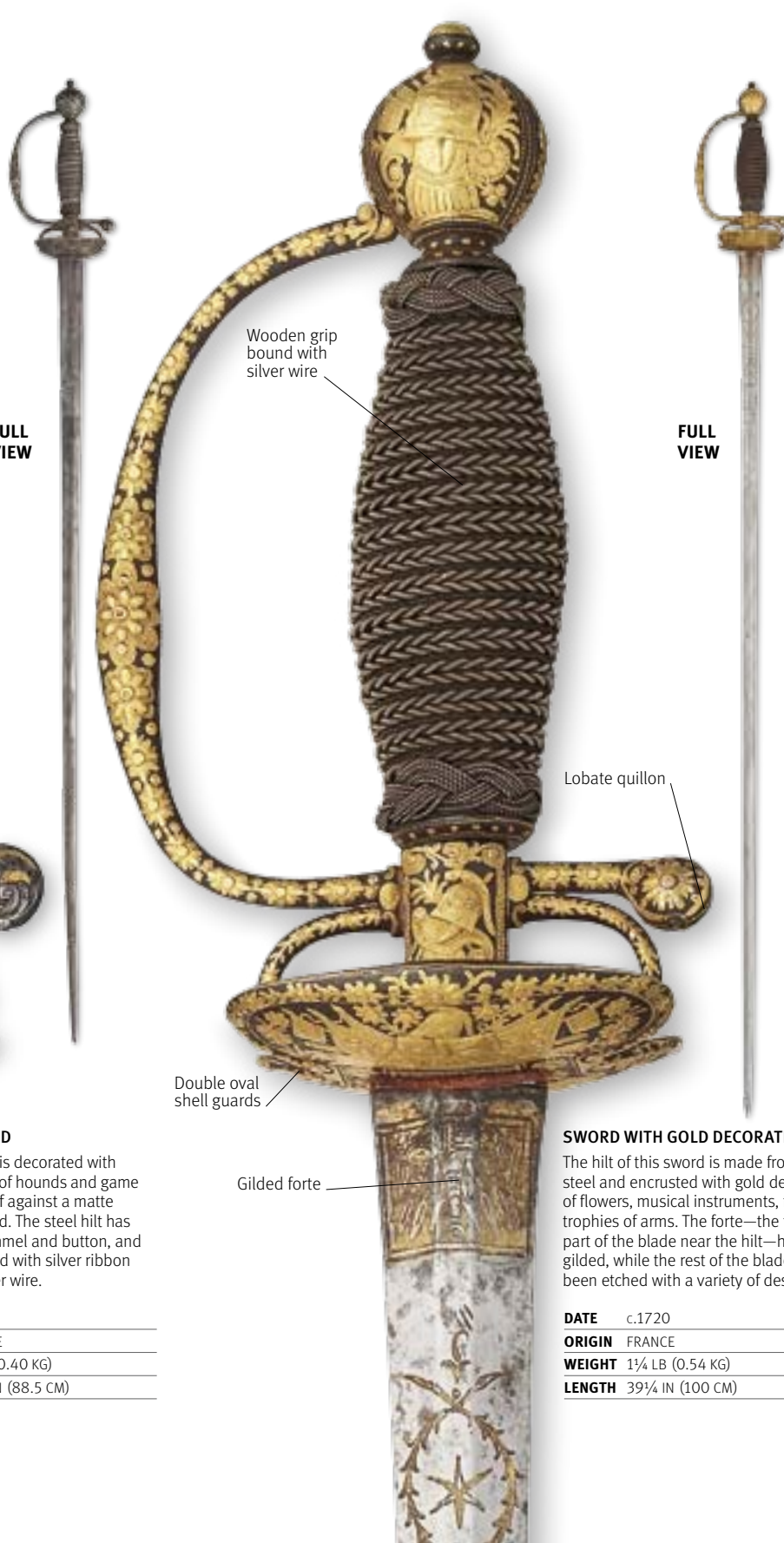
This fine sword is decorated with hunting scenes of hounds and game chiseled in relief against a matte gold background. The steel hilt has a spherical pommel and button, and the grip is bound with silver ribbon and plated silver wire.

DATE c.1720

ORIGIN FRANCE

WEIGHT ¾ LB (0.40 KG)

LENGTH 34¾ IN (88.5 CM)



FULL VIEW

SWORD WITH GOLD DECORATION

The hilt of this sword is made from blued steel and encrusted with gold decoration of flowers, musical instruments, flags, and trophies of arms. The forte—the thickest part of the blade near the hilt—has been gilded, while the rest of the blade has been etched with a variety of designs.

DATE c.1720

ORIGIN FRANCE

WEIGHT 1¼ LB (0.54 KG)

LENGTH 39¾ IN (100 CM)



FULL VIEW

COLICHEMARDE-TYPE SWORD

The silver hilt of this sword is chiseled with musical trophies and the grip is bound with silver foil and wire. The hollow triangular section of the blade is of a colichemarde type where the forte is particularly wide. The strengthened forte was used for parrying an opponent's sword, leaving the blade light at the point to increase speed and control.

DATE c.1756
ORIGIN ENGLAND
WEIGHT 1 LB (0.45 KG)
LENGTH 39¼ IN (99.5 CM)

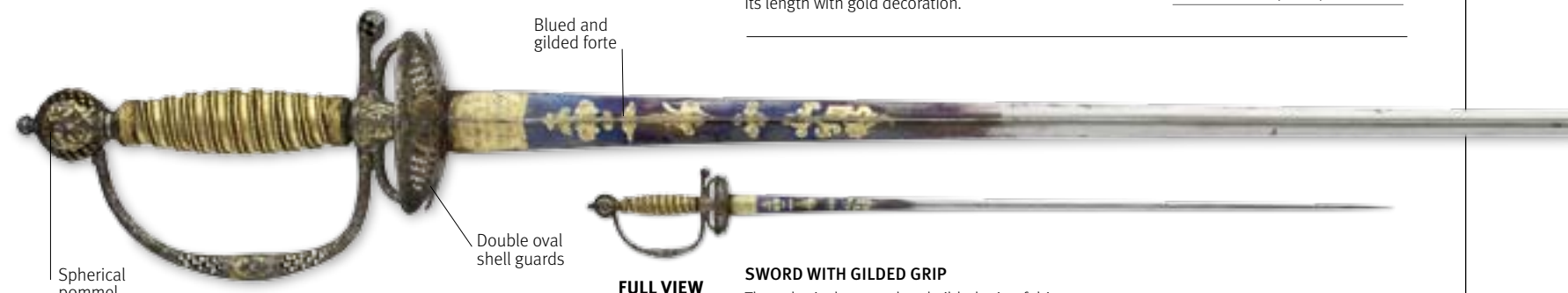


FULL VIEW

SWORD WITH WIRE KNUCKLE GUARD

This sword's distinguishing features are the urn-shaped pommel, a knuckle guard of cut-steel beads strung on wire, and a dished oval guard decorated with pierced triangles in three rows. The blade is blued for much of its length with gold decoration.

DATE c.1825
ORIGIN ENGLAND
WEIGHT 1 LB (0.45 KG)
LENGTH 39 IN (99 CM)

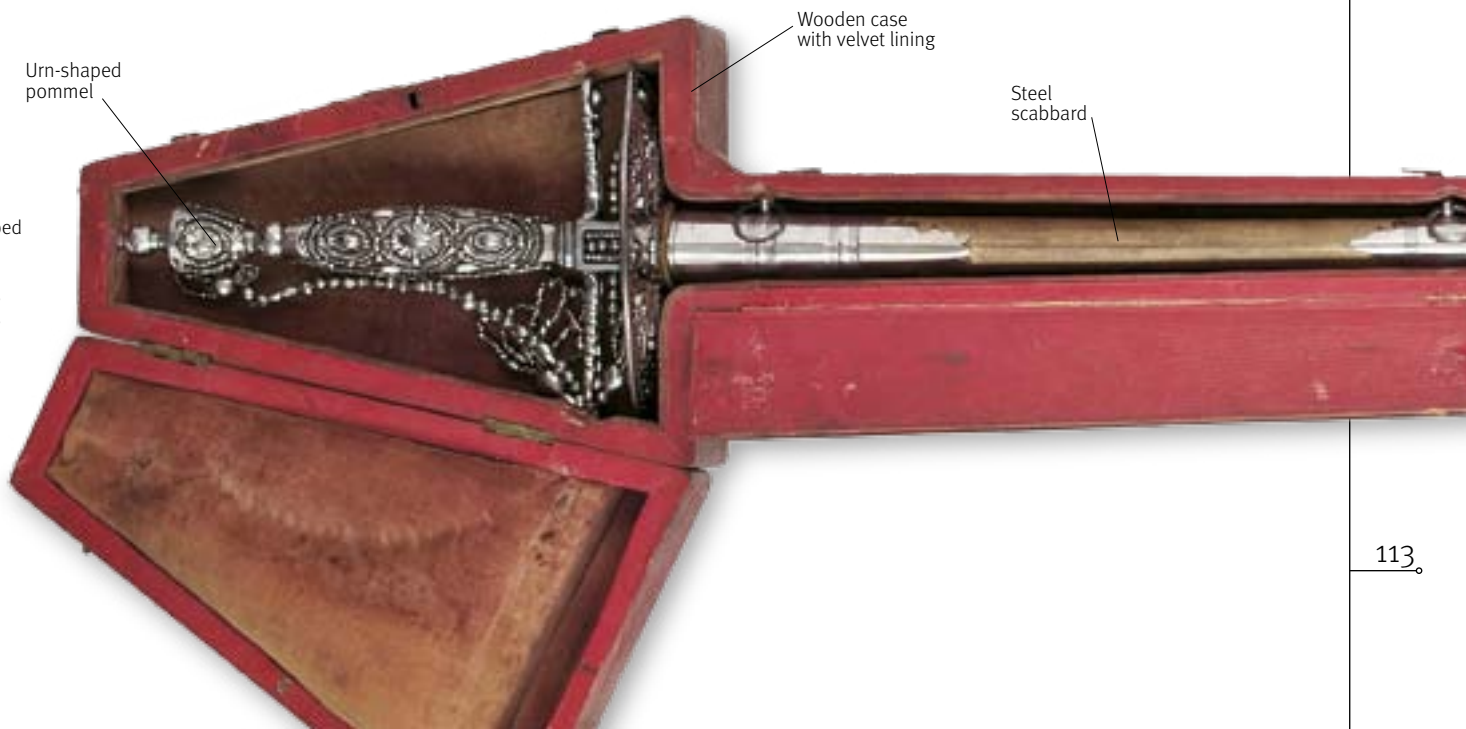


FULL VIEW

SWORD WITH GILDED GRIP

The spherical pommel and gilded grip of this smallsword are complemented by a lobate quillon and two symmetrical shell guards. The forte of the blade is blued with gold embellishments.

DATE c.1770
ORIGIN FRANCE
WEIGHT 15 OZ (0.43 KG)
LENGTH 15½ IN (39.5 CM)



CASED SWORD

Boxed within a sword case, this British smallsword has an urn-shaped pommel, a faceted steel grip, and a knuckle guard of cut-steel beads on wire. Below the straight quillons is a dished oval guard. The blade is encased within a scabbard.

DATE c.1825
ORIGIN ENGLAND
WEIGHT 1 LB (0.45 KG)
WEIGHT 39 IN (99 CM)



BATTLE OF MARIIGNANO

French King François I fought a close battle against Swiss pikemen in September 1515 at Marignano, modern-day Melegnano near Milan. The King and his army of Landsknecht mercenaries are depicted here in a relief on the King's tomb.



EUROPEAN HUNTING SWORDS

DURING THE 16TH century specialist hunting swords came into widespread use among Europe's aristocracy. The swords were short in length, and often had a slightly curved, single-edged blade. For the most part, hunting swords were used to finish off an animal wounded by a spear or shot, although in the case of boar swords they might act as the primary weapon. In many instances, hunting swords were elaborately decorated and often featured engraved scenes of the chase. During the 18th century the hanger type of hunting sword acted as a model for the ordinary soldier's fighting sword.

Gilt pommel in the form of a lion's head.

HUNTING HANGER

This magnificently decorated hanger may have belonged to Cosimo de Medici (1519–74). It was probably used in the hunting of large game such as wolves or bears.

DATE	c.1550
ORIGIN	ITALY
WEIGHT	3½ LB (1.68 KG)
LENGTH	24 IN (61 CM)

Curved quillon terminating in lion's head

Cross-guard with acanthus leaf decoration

Shell with lion motif

Medici coat of arms

Single-edged blade

Mushroomlike pommel cap

Modern, velvet-covered grip

HUNTING HANGER

An ornate hunting sword of the hanger type: short, curved, single-edged blade used by men on foot. Its blackened iron hilt is decorated with encrusted patterns in silver. The shell guard is formed as if of three interlaced ribbon ends, and the decoration at the pommel echoes this design.

DATE	c.1640
ORIGIN	ENGLAND
WEIGHT	2 LB (0.86 KG)
LENGTH	29½ IN (75 CM)

Iron guard in the shape of ribbons

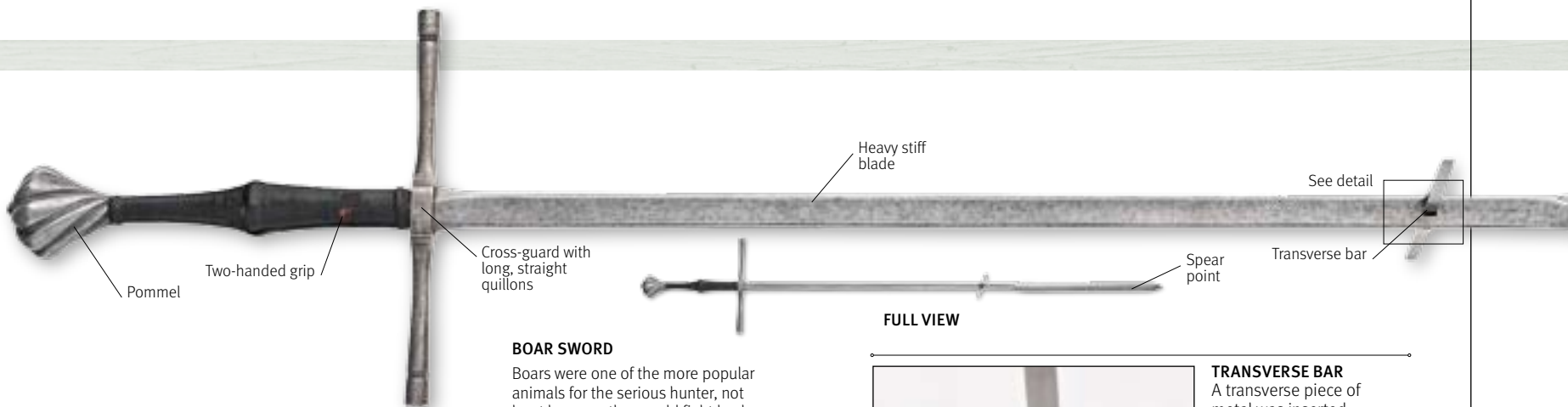


FULL VIEW

Decorated quillon

Single-edged German blade





BOAR SWORD

Boars were one of the more popular animals for the serious hunter, not least because they could fight back and had dangerous tusks. Boars were traditionally hunted with spears, but in the late 15th century a specialist sword came into use, featuring a stiff blade with a transverse bar.

DATE	c.1550
ORIGIN	EUROPE
WEIGHT	4¼ LB (1.98 KG)
LENGTH	51½ IN (131 CM)

FULL VIEW



TRANSVERSE BAR

A transverse piece of metal was inserted toward the end of the blade to prevent the charging boar from running up the blade and goring the hunter. The boar was a ferocious and fast-charging animal, and in its death throes would continue to force its way up a conventional spear or sword.

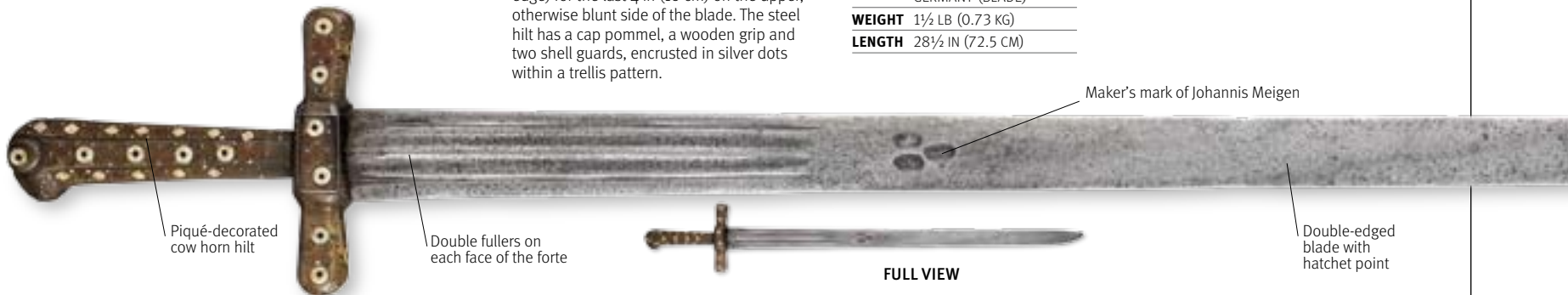


HUNTING HANGER

This hanger has a single-edged curved blade with a "false edge" (in fact, a sharpened edge) for the last 4 in (10 cm) on the upper, otherwise blunt side of the blade. The steel hilt has a cap pommel, a wooden grip and two shell guards, encrusted in silver dots within a trellis pattern.

DATE	c.1650
ORIGIN	ENGLAND (HILT) GERMANY (BLADE)
WEIGHT	1½ LB (0.73 KG)
LENGTH	28½ IN (72.5 CM)

FULL VIEW

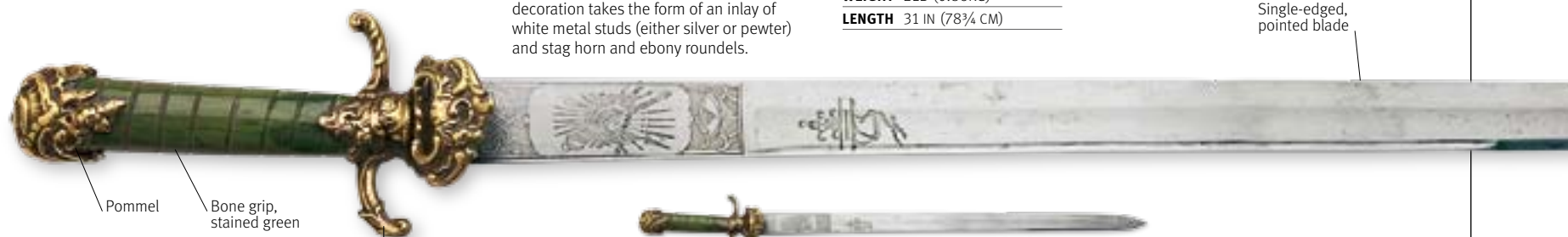


HUNTING HANGER

Manufactured in England, but using a German blade, the hilt of this sword is made from cow horn and features a cruciform hilt and "beak"-shaped pommel. The piqué decoration takes the form of an inlay of white metal studs (either silver or pewter) and stag horn and ebony roundels.

DATE	1647
ORIGIN	ENGLAND (HILT) GERMANY (BLADE)
WEIGHT	2LB (0.86KG)
LENGTH	31 IN (78¾ CM)

FULL VIEW



STRAIGHT HANGER

This short hunting sword from the late 18th century is of a more decorative than functional design. The brass guard and pommel are complemented by a straight, finely engraved, single-edged blade.

DATE	c.1780
ORIGIN	FRANCE
WEIGHT	2LB (0.86KG)
LENGTH	29½ IN (75 CM)

FULL VIEW

HUNTING TROUSSE

HUNTING IN THE MEDIEVAL and Renaissance period was seen both as a means of putting meat on the table and as training for war. Preparatory to setting out on the chase, the huntsman would assemble a trousse; a set of carving and eating tools contained within a sheath. This would typically contain miniature saws, small cleavers, and carving knives that were used for killing, skinning, jointing, serving, and finally eating the animal. The German hunting tradition produced many fine examples of hunting weapons; the sword and cleaver displayed here are a matched set that would have been used by a Saxon huntsman in the late 17th century.



TROUSSE SCABBARD

Made of leather to hold the thick-bladed cleaver, this scabbard also contains five meat-trimming utensils, including a carving knife (below).

Initials refer to the owner John-George II

HUNTING SWORD

Relatively long for a hunting sword, this weapon features an interesting guard that comprises straight quillons combined with S-shaped quillons, the lower one forming a simple knuckle guard. All four are decorated with leaf-shaped finials.

DATE	1662
ORIGIN	GERMANY
WEIGHT	12LB (2.2KG)
LENGTH	35.2IN (90CM)



Stag horn grip decorated with brass studs

Cross-guard

Leaf-shaped finial

Straight quillon

Knuckle guard



Guard

HUNTING CLEAVER

While the sword delivered the *coup de grace* to the wounded animal, the cleaver was used to dismember the carcass. This sharp, heavy blade would have little trouble in cutting through animal joints, including those from larger beasts such as boar and deer.

DATE	c.1662
ORIGIN	GERMANY
WEIGHT	2¼LB (1KG)
LENGTH	18IN (46CM)



CARVING KNIFE

Maker's mark

WEAPON SHOWCASE



Forward-facing S-shaped quillon

Maker's mark

FULL VIEW

Single-edged blade with narrow fuller extending most of its length



SWORD SCABBARD AND TWO SMALL KNIVES

The sword's leather scabbard has a pouch containing two small knives and the bodkin. The latter is a tool for making holes; it also has a file for sharpening knives.



BODKIN

File for sharpening knives

Fuller running down length of blade



Sharp blade for trimming meat

Heavy single-edged blade

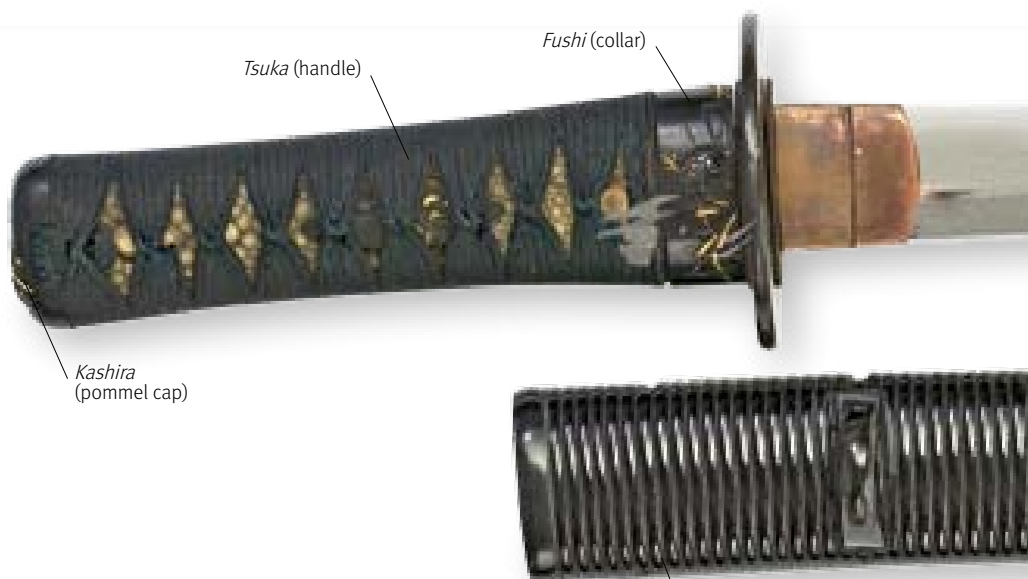


FULL VIEW



JAPANESE SAMURAI SWORDS

JAPANESE SWORD BLADES are considered among the finest ever made. Their success was due to the combination of a hard cutting edge with a softer, resilient core and back. After a complex process creating a soft core enfolded in hard outer layers of steel, the swordsmith covered the blade in clay, leaving only a thin layer over what was to become the cutting edge. During quenching the edge cools rapidly, becoming very hard, while the back cools more slowly, and softens. The mountings for blades developed their own aesthetic finesse. For example, in the 15th century, the manufacture of *tsuba* (guards) became a separate profession, and these are now collectors' items in their own right.



SAMURAI RULER

This print, entitled *Shizu Peak Moon*, shows the great Japanese warlord Toyotomi Hideyoshi (1536–98) blowing his war trumpet at dawn before the famous victory over Shibata Katsuie at Shizugatake in 1583, which made him undisputed ruler of Japan. Hideyoshi has a *tachi* and a *tanto* tied into his belt or *obi*.



WAKAZASHI FROM A DAISHO

The custom for a samurai to wear two swords, a long *katana* and a shorter *wakazashi*, was established in the 16th century. In the Edo period (1603–1876) samurai sometimes wore a *wakazashi* and a *katana* with matching mountings on hilts and scabbards, a combination known as a *daisho*. This *wakazashi* forms a *daisho* with the *katana* below.

DATE 18TH CENTURY

ORIGIN JAPAN

WEIGHT 1¼ LB (0.55 KG)

LENGTH 19¾ IN (50 CM)



SHEATHED KATANA

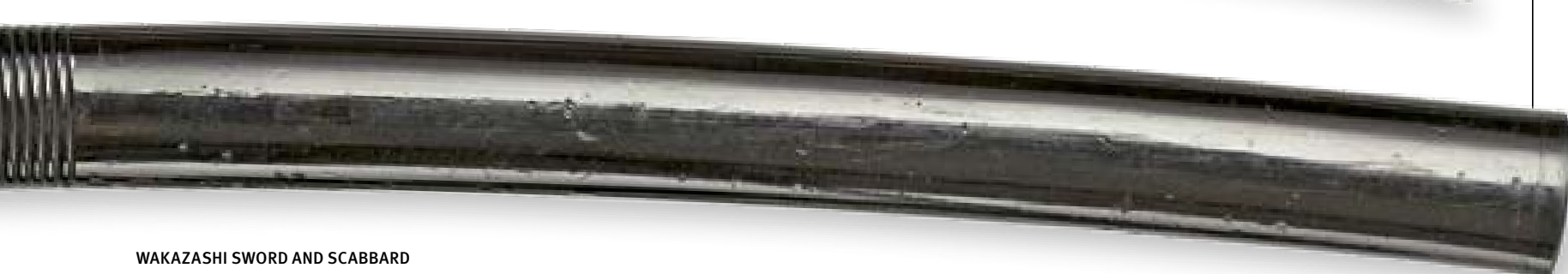
This *katana* forms a *daisho* in combination with the matching *wakazashi* above. In the Edo period, the longer sword was exclusively worn by samurai, whereas merchants and townsmen were allowed to carry a *wakazashi*. In combat a samurai typically held the *katana* in a two-handed grip, for which the *tsuka* (handle) allows plenty of room.

DATE 18TH CENTURY

ORIGIN JAPAN

WEIGHT 1½ LB (0.68 KG)

LENGTH 27½ IN (69.8 CM)



WAKAZASHI SWORD AND SCABBARD

A *wakazashi* is a sword with a blade 30–60 cm (12–24 in) long. Japanese blades are also differentiated by details of shape and by their *hamon*—the line left between the areas of the blade covered and uncovered during the tempering process. There are various patterns of *hamon*, some associated with specific swordsmiths. This blade was made by Seshu ju Nagatsuna.

DATE c.17TH CENTURY

ORIGIN JAPAN

WEIGHT 2 LB (0.97 KG)

LENGTH 18½ IN (46.8 CM)

1500—1775

◀ 66–67 JAPANESE AND CHINESE SWORDS

▶ 124–125 WEAPON SHOWCASE: WAKAZASHI SWORD

▶ 126–127 GREAT WARRIORS: SAMURAI

JAPANESE SAMURAI SWORDS

WAKAZASHI AND SCABBARD

The *wakazashi* was a samurai's constant companion, worn from waking until sleeping, and even kept nearby during the night. As well as serving as an additional fighting sword to the *katana* and as, in effect, a side-arm, it was often the weapon used by samurai to perform ritual suicide (*seppuku*).

DATE 17TH CENTURY
ORIGIN JAPAN
WEIGHT 1 LB (0.42 KG)
LENGTH 19 IN (48.5 CM)

Mekugi joins
hilt to tang
of blade

Pocket for
katagana

Kashira
(pommel)

Silk braid

TACHI IN GOLD SCABBARD

The blade of a *tachi* was traditionally over 24 in (60 cm) in length, although shorter than the *nodachi* field sword, which was worn slung over a samurai's shoulder. *Tachi* hilts were fitted with a traditionally shaped *kashira* that wrapped around the end.

DATE LATE 18TH CENTURY
ORIGIN JAPAN
WEIGHT 1½ LB (0.68 KG)
LENGTH 28¾ IN (71.75 CM)

Rayskin

Menuki
(hilt ornament)

Ornate lacquered
scabbard

Sageo (cord)

ORNATE WAKAZASHI

This is a lavishly mounted reproduction *wakazashi*. The real thing would almost certainly have been worn on ceremonial occasions as a display of status. The sides of the scabbard carry the *katagana* (knife) and *kogai* (hair-arranging implement) associated with the *wakazashi*.

DATE 20TH CENTURY
ORIGIN JAPAN
WEIGHT 1 LB (0.42 KG)
LENGTH 20 IN (c.50 CM)



Kissaki (point)

Sageo (cord)

Black lacquered scabbard

Semegane
(scabbard ring)

Gold-lacquered
saya (scabbard)

GUNTO IN SCABBARD

During the period of militarism in the 1930s, the Japanese adopted a style of sword for army officers based on the traditional *tachi*. Most were fitted with a mass-produced blade, but the mount is capable of being fitted to a traditional blade.

DATE 1933

ORIGIN JAPAN

WEIGHT 1½ LB (0.72 KG)

LENGTH 27 IN (68.9 CM)

Shirasaya
(storage
scabbard)

Kogatana (knife)
in pocket on side
of scabbard

Habaki (collar)

Hole in guard
for knife to
pass through

Syajira
(scabbard tip)

WAKAZASHI SWORD

THE HILT AND GUARD of this Japanese short sword, or *wakazashi*, are of a style popular in the Edo period (1603–1876). It might have been worn by a samurai when in civilian dress, as an accompaniment to his long sword (*katana*), or on its own by rich merchants or townsmen. When indoors, a samurai would leave the long sword on a rack by the door, but would still wear the *wakazashi*. The mounting (hilt and guard) was a separate item to the blade. A well-off individual might have several mountings for a single blade, choosing the most suitable style for a given occasion. A lavish mounting was a visible symbol of the wearer's wealth.



SUNAGI

When it was not fitted on a blade, the mounting of the sword would be assembled on a wooden copy of a blade and tang called a *sunagi*. Separated from its mounting, the blade was stored in a wooden scabbard with a plain wood grip called a *shirasaya*.

DATE	17TH CENTURY
ORIGIN	JAPAN
BLADE WEIGHT	1 LB (0.49 KG)
BLADE LENGTH	21 IN (53.4 CM)

MEKUGI

The *mekugi* was a small peg that passed through a hole in the hilt and a corresponding hole in the tang of the blade. It thus fixed the hilt to the tang. The *mekugi* was usually made of bamboo, but occasionally of horn or ivory.



BLADE

The blade was the heart of the sword. Making its hard, sharp edge and softer, resilient core and back was a complex, skilled operation. The tang was often marked with the swordsmith's signature; this blade is signed by Tadahiro of Hizen province on Kyushu island.



Nakago (tang)

Hole for mekugi

Hamachi (edge notch)

Munemachi (back notch)

Kashira (pommel)

Rayskin

Menuki (hilt ornament)



Silk braid

Hole for mekugi

Fuchi (collar)



HABAKI

The *habaki*, a part of the blade rather than the mounting, slid over the tang and butted against the blade notches.

TSUKA

The hilt, or *tsuka*, was made of magnolia wood. It was grooved on the inside to fit exactly the tapering shape of the tang. The rayskin covering was valuable, hence perhaps the lozenge openings in the silk braid that allow it to be seen. The *menuki* ornaments have the practical function of helping to fill the hand gripping the sword.

TSUBA AND SEPPA

The metal guard, or *tsuba*, had a central hole for the tang, flanked by holes for the *kogatana* and *kogai*. Copper spacers (*seppa*) fitted on each side of the guard. *Tsuba* were decorated with gold or silver inlay.

Tsuba (handguard)

Seppa (spacer)

Hole for tang



Hole for kogaana



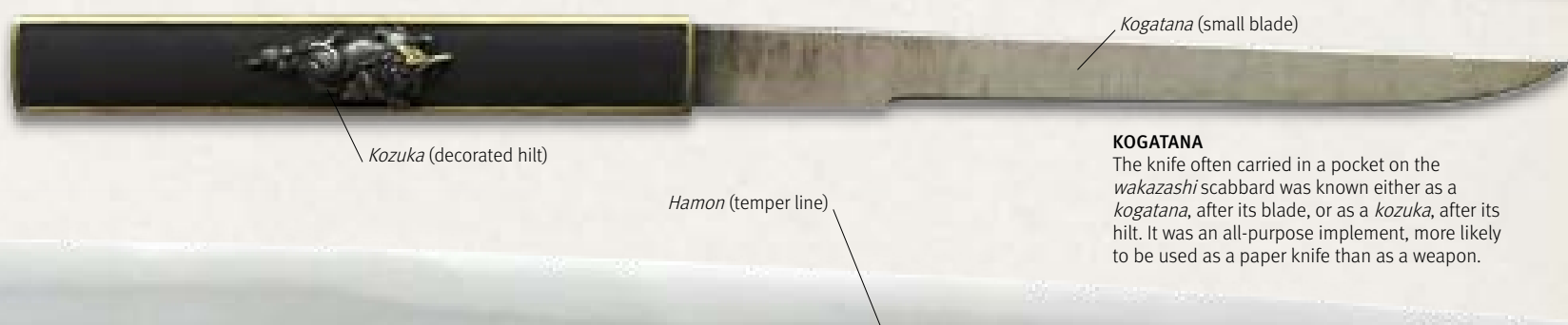
Hole for kogai



WEAPON SHOWCASE



FULL VIEW



KOGATANA

The knife often carried in a pocket on the *wakazashi* scabbard was known either as a *kogatana*, after its blade, or as a *kozuka*, after its hilt. It was an all-purpose implement, more likely to be used as a paper knife than as a weapon.



SAYA

Like the hilt, the *saya* (scabbard) was made of magnolia wood. It was lacquered to protect it from the weather. The *sageo*, a length of strong braid, attached the scabbard to the owner's belt. Pockets on opposite faces of the scabbard held a small knife (*kogatana*) and an implement known as a *kogai*.

KOGAI

The *kogai*, often slipped into a pocket on the *wakazashi* scabbard, was primarily an implement employed in arranging a samurai's hair. A knob on the end of the handle was used to clean out earwax.



**THE LONG SWORD
(KATANA)**

SAMURAI

ORIGINALLY FIGHTING in the service of the emperor or nobles, by the 12th century, the samurai had emerged as a warrior elite, dominating Japanese society. The shogunate, established in 1185, made the samurai rulers of Japan, with the emperor as a figurehead. Centuries of civil war took place between samurai clans and *daimyo* (warlords) until pacification under the Tokugawa shogunate in the 1600s reduced the clans to redundancy—a military elite with no wars to fight.

EVOLVING WARRIORS

The early samurai were, above all, archers. It was not until the 13th century that the sword gained ascendancy over the bow as a samurai weapon. Early samurai warfare was often individualistic and ritualized. When battle lines were drawn, leading warriors would challenge prominent enemies to combat with long, florid speeches, and then gallop forward shooting arrows. It was warfare largely conditioned by the fact that, with the exception of two brief Mongol landings in 1274 and 1281, the medieval samurai fought only one another. Along with ritualized combat went ritualized death, as the tradition developed of defeated samurai committing *seppuku* (ritual suicide) by *hara-kiri* (the belly-cut). The concept of an honorable death was given higher value than victory in battle.

In the Sengoku period, from the 1460s to 1615, samurai warfare became more practical, organized, and varied. As constant warfare raged between the *daimyo*, the samurai fought in large armies on foot or in the saddle, supported by disciplined bodies of infantry, the *ashigaru*, drawn from the common people. The samurai completely abandoned the bow, which became an *ashigaru* weapon, relying on their swords and long spears.

DOOMED ARCHER

Minamoto Yoshihira flourishes his bow, the prime weapon of the early samurai. Yoshihira was captured and executed by the rival Taira clan after being on the losing side in the Heiji Incident in 1160.

MINAMOTO YORIMASA

Minamoto Yorimasa is credited with establishing the pattern for samurai ritual suicide. He was a veteran in his 70s when, in 1180, he led the Minamoto clan against the Taira at the outset of the Gempei Wars. Defeated at the battle of Uji, Yorimasa retreated to a temple, where he wrote an elegant poem on the back of a fan before cutting open his abdomen with a dagger.

**MINAMOTO
YORIMASA IN
FORMAL DRESS**


SAMURAI ARMOUR

This samurai armour is in the *o-yoroi* (great armour) style that predominated from the 12th to the 14th century. Japanese armour is always designed to impress as well as protect.



ELITE FORCES

The samurai completely abandoned the bow, which became an *ashigaru* weapon, relying instead on their swords and long spears. Their battlefield dominance was challenged by the introduction of firearms—the great general Oda Nobunaga equipped his *ashigaru* with arquebuses to devastating effect at the battle of Nagashino in 1575. But the samurai remained elite forces and their professionalization in the Sengoku period did not preclude personal duels and legendary feats of individual swordplay. Many of these were attributed to *ronin*, wandering masterless samurai whose instruction manual *The Book of Five Rings* helped pass on the mystique of samurai swordsmanship to later generations.

After the definitive victory of the Tokugawa clan established a durable peace, the samurai remained a privileged class with the exclusive right to bear arms. It was at this time that the principles of samurai behavior were formalized into the chivalric *bushido* code, stressing loyalty as the supreme virtue and sacrificial death as the highest fulfilment of life. The samurai class was formally abolished in 1876 after the Meiji Restoration.



CLAN BATTLE

Armies of the Minamoto and Taira clans clash with swords in one of the battles of the Gempei Wars (1180–85), the conflict that established the Minamoto shogunate.

“IT IS NOT THE WAY OF THE WARRIOR TO BE SHAMED AND AVOID DEATH... I WILL HOLD OFF THE FORCES OF THE ENTIRE COUNTRY HERE AND DIE A RESPLENDENT DEATH.”

SAMURAI TORII MOTOTADA, AT THE SIEGE OF FUSHIMI CASTLE, 1600

TOOLS OF COMBAT



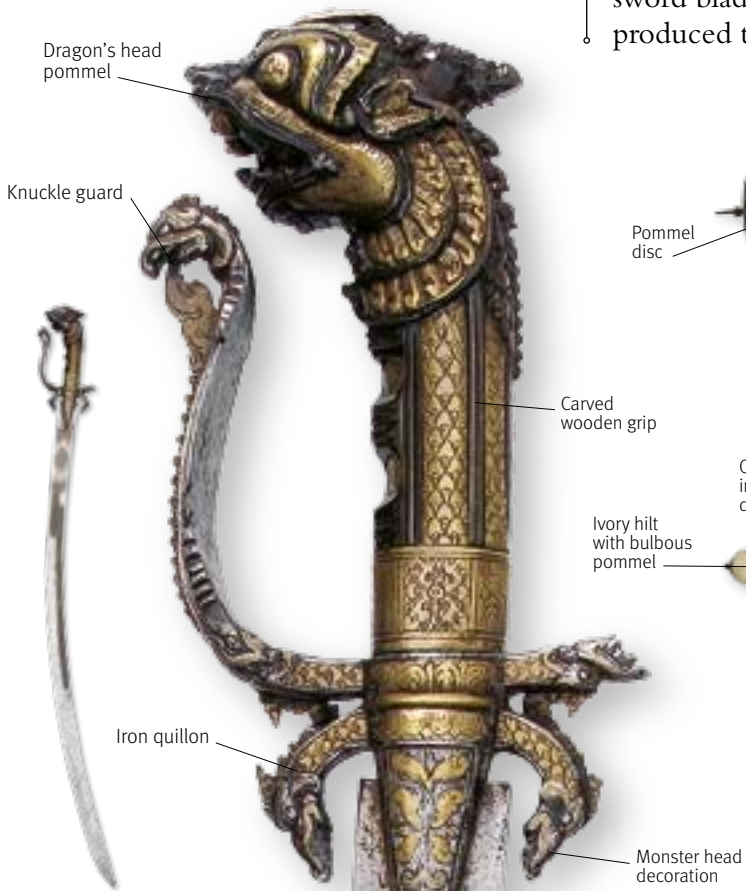
TACHI SWORD AND SCABBARD

WAKAZASHI DAGGER AND SHEATH

LATE SAMURAI SPEAR

INDIAN AND SRI LANKAN SWORDS

THE ESTABLISHMENT OF THE Mughal Empire in northern India in the 16th century brought with it the fine curved swords found through most of the Islamic world. These *talwars* and *shamshirs* were superb cutting instruments that achieved near-perfection of form and function. Although many Hindu princes adopted the *talwar*, the traditional straight-bladed Hindu *khanda* continued to be made. By the 18th century, many sword blades were being imported from Europe, where manufacturers produced to Indian designs.



FULL VIEW

KASTANE

The *kastane*, the characteristic sword of Sri Lanka, had a short, curved blade, usually imported, and a hilt carved with fantastical decorations. Its value as a work of craftsmanship equaled its effectiveness as a weapon. The example shown here dates from the time of the Portuguese occupation of Sri Lanka.

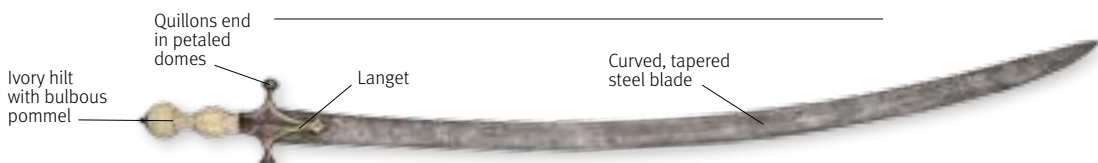
DATE	HILT: 17TH CENTURY
ORIGIN	SRI LANKA
WEIGHT	1¼ LB (0.55 KG)
LENGTH	36¼ IN (92 CM)



KHANDA

The straight *khanda* is the traditional sword of Hindu India. This example, made under the influence of the Mughal Empire, has a hilt that is of Indo-Muslim design. Its decoration includes the repeated image of an eagle.

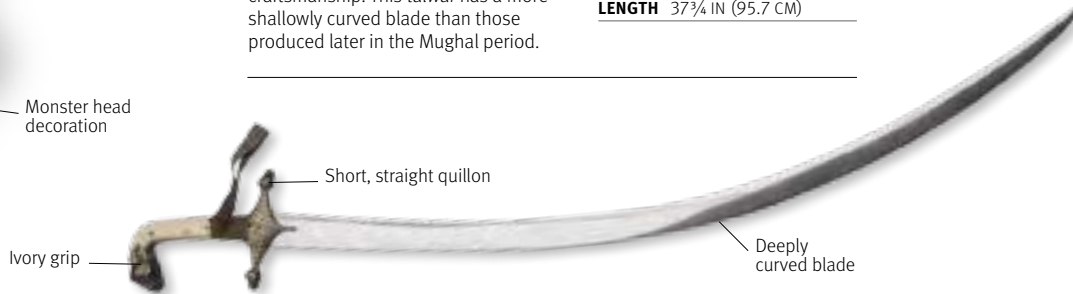
DATE	1632–33
ORIGIN	MUGHAL INDIA
WEIGHT	2¾ LB (1.25 KG)
LENGTH	35 IN (89 CM)



TALWAR

The *talwar*, of Persian origin, was the quintessential sword of Mughal India. Many were works of outstanding craftsmanship. This *talwar* has a more shallowly curved blade than those produced later in the Mughal period.

DATE	EARLY 17TH CENTURY
ORIGIN	MUGHAL INDIA
WEIGHT	2¾ LB (1.04 KG)
LENGTH	37¾ IN (95.7 CM)



SHAMSHIR

The *shamshir* is the sword known to Europeans as the scimitar. It was introduced to India in the 16th century from Persia. This example is typical of Persian production, with its deeply curved, single-edged, tapering blade. In combat, it was superbly suited to slashing, but less effective for thrusting.

DATE	EARLY 19TH CENTURY
ORIGIN	LUCKNOW, INDIA
WEIGHT	2 LB (0.86 KG)
LENGTH	36½ IN (93 CM)



FULL VIEW



Brass-wire inlay decoration



AYUDHA KATTI

Indigenous to Mysore, Kurg, and the Malabar coast, the *ayudha katti* developed from an implement used to cut through dense undergrowth. Its blade, like that of the Turkish *yataghan* and northern Indian *sosun pattah*, is related to the Ancient Greek *kopis* blade.

DATE 18TH CENTURY
ORIGIN KURG, INDIA
WEIGHT 2½ LB (1.15 KG)
LENGTH 23½ IN (59.5 CM)



Broad, forward-curving blade



TALWAR

This sword was in use in Mysore, southern India, at the time of the wars between the British East India Company and Mysore's ruler, Tipu Sultan. The deeply curved blade is in a traditional Indian style.

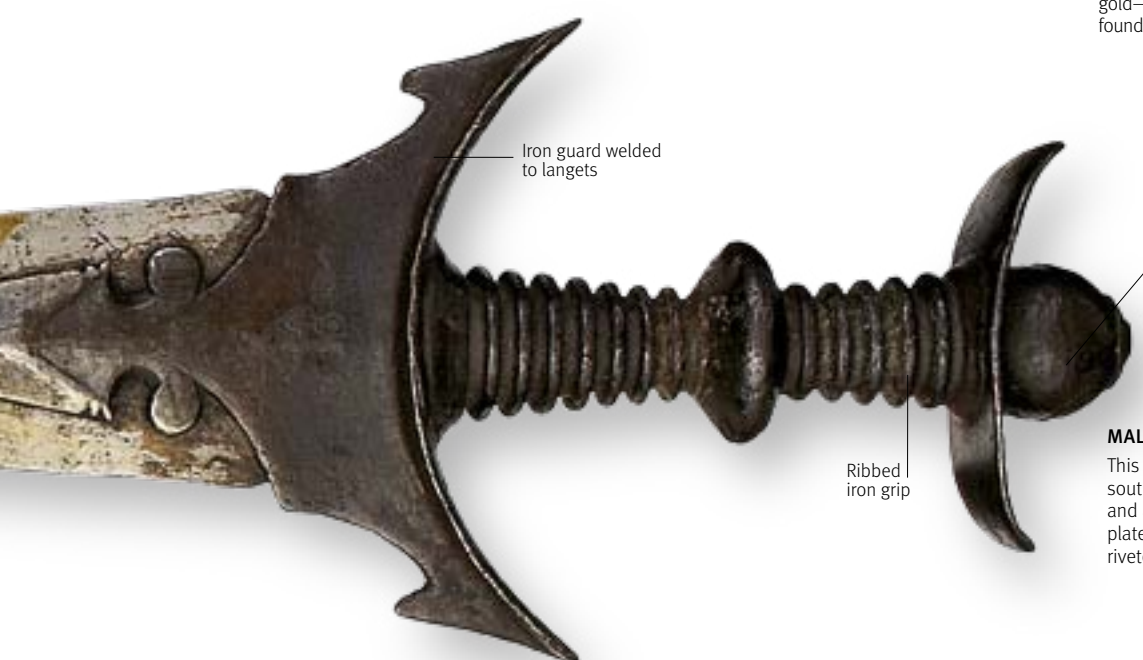
DATE LATE 18TH CENTURY
ORIGIN MYSORE, INDIA
WEIGHT 3 LB (1.38 KG)
LENGTH 34¾ IN (88.3 CM)



TALWAR

Probably made in Lahore, in what is now Pakistan, this *talwar* with a Persian blade bears a bilingual inscription in Hindi and Urdu inside the knucklebow. The hilt is decorated with *koftgari*—steel inlaid with gold—which was a form of ornamentation found on many Indian swords.

DATE 1801–02
ORIGIN LAHORE, INDIA
WEIGHT 2 LB (0.91 KG)
LENGTH 23½ IN (59.5 CM)



MALIBAR COAST SWORD

This straight, double-edged sword from southern India has a ribbed iron grip, and a U-shaped guard and pommel-plate. The blade broadens where it is riveted to langets on each face.

DATE 18TH CENTURY
ORIGIN MALIBAR, INDIA
WEIGHT 1½ LB (0.65 KG)
LENGTH 36¾ IN (83 CM)

EUROPEAN DAGGERS

THE DAGGER'S PRIME ROLE as a weapon of self-defense continued into the 16th and 17th centuries, although some new variants evolved, including the left-hand, or *maingauche* dagger. As its name suggests, this dagger was held in the left hand and complemented a sword or rapier held in the right. The left-hand dagger parried thrusts and cuts from the opponent's blade, and acted as an offensive weapon in its own right. The bayonet, another modification of the dagger, continues in use to this day.



Decorated pommel echoes style of quillons

Restored wooden grip

Ricasso with two fullers

Diamond-section blade

FULL VIEW

QUILLON DAGGER

The forward-facing quillons of a left-hand dagger were intended to hold an opponent's blade so that it could be deflected away safely.

DATE c.1600
ORIGIN EUROPE
LENGTH 16½ IN (42 CM)

Shell-shaped pommel

Steel tang without grip

Small shell guard

Forward-facing quillon

Double-sided blade

Forward-facing quillon with shell-shaped finial

QUILLON DAGGER

This English left-hand dagger features a scallop-shell motif that is expressed in the iron pommel, shell guard, and quillon finials. A dagger such as this was used for parrying an opponent's blade and also for close combat.

DATE LATE 16TH CENTURY
ORIGIN ENGLAND
LENGTH 15¼ IN (38.7 CM)

Pierced triangular knuckle guard with rompepuntas rim

Ricasso

Extra wide, straight quillon to defend against cutting strokes

Trap for opponent's blade

Sharpened edge only on last third of blade

ITALIAN MAINGAUICHE

During the 17th century, the left-hand dagger fell out of fashion, except in Spain and southern Italy where it developed into the highly specialized weapon depicted here, complete with wide knuckle guard and quillons.

DATE c.1650
ORIGIN NAPLES, ITALY
LENGTH 22 IN (56 CM)



DUDGEON DAGGER

A descendent of the medieval ballock dagger, the dudgeon dagger became increasingly Scottish in character toward the end of the 16th century, defined by its wooden handle and the panels of foliate decoration on the blade. The main scabbard often included a smaller scabbard for holding a by-knife.

DATE c.1603
ORIGIN SCOTLAND
LENGTH 14 IN (35.4 CM)

Small scabbard for by-knife (missing)



HIGHLAND DIRK

In the 16th and 17th centuries, Scottish Highlanders armed themselves with long, unadorned daggers called dirks. Like the dudgeon, the dirk evolved from the ballock knife. Toward the end of the 18th century, the dirk became increasingly ceremonial in form. It was often decorated with silver pommel caps and ferrules.

DATE EARLY 18TH CENTURY
ORIGIN SCOTLAND
LENGTH 12–18 IN (30–45 CM)

Wooden hilt with strap-interlace work on grip



QUILLON DAGGER

The forward-facing quillons of this weapon are typical of a left-handed dagger. Other features include a flat, vat-shaped pommel with vertical fullers, a wooden grip bound with iron wire, and a ring jutting out from the cross-guard to protect the hand.

DATE LATE 16TH CENTURY
ORIGIN EUROPE
LENGTH 19 IN (48.1 CM)

Forward-facing quillon

Projecting ring guards hand

Iron-wire covered grip

Ricasso

Steel pommel

Diamond-section, double edged blade

Narrow tip

Four-sided blade

STILETTO

Typically known as “the assassin’s weapon,” the stiletto was popular in Italy during the 16th and 17th centuries. Being long and thin, it was easy to conceal, and its triangular or four-sided blade could penetrate easily and deeply into the human body. The narrow point could even pierce mail and pass through gaps in plate armor.

DATE LATE 16TH CENTURY
ORIGIN ITALY
LENGTH 11¾ IN (30 CM)

Cross-guard with truncated quillons

Chiseled steel hilt

EUROPEAN DAGGERS

Button terminal to decorated pommel



FULL VIEW

Ornate grip

PRESENTATION DAGGER

This extensively decorated dress dagger was presented to Henri IV, King of France, by the city of Paris to commemorate his marriage to Marie de Medici. The entire dagger is lavishly covered in oval discs of mother-of-pearl, with gold inlay.

DATE 1598–1600
ORIGIN FRANCE
WEIGHT 1¾ LB (0.81 KG)
LENGTH 20 IN (50.8 CM)

Ring guard



Elaborately decorated ricasso

Forward-facing quillon

Mother-of-pearl disc

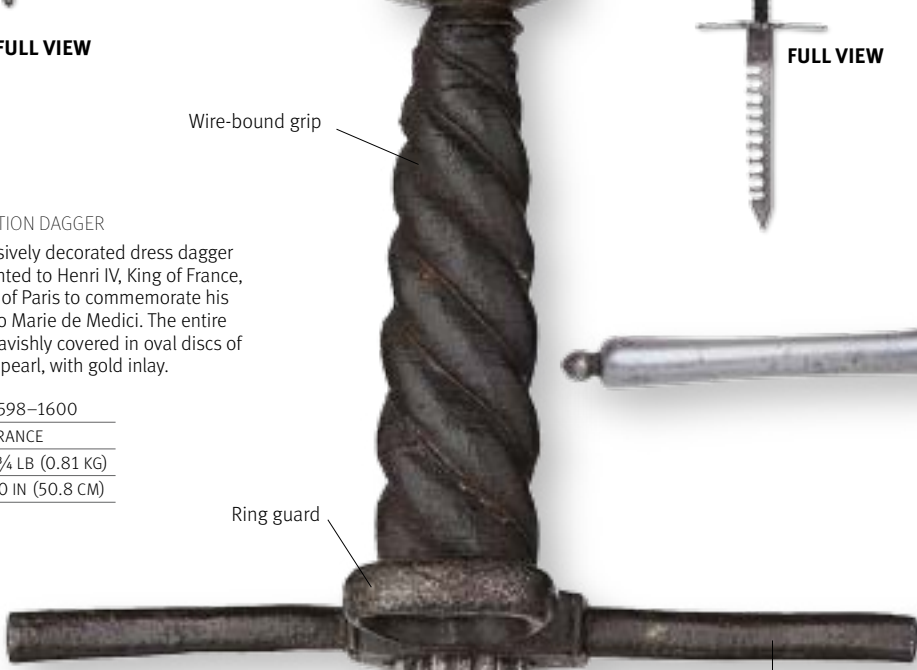
Gold inlay

Blade edge is unadorned

Fluted steel pommel



Wire-bound grip



Ring guard

Straight, unadorned quillon

Blade has serrated edge

SWORD-BREAKER

One of the more extreme left-hand daggers was the so-called sword-breaker. The comb-shaped steel blade was designed to trap an opponent's sword, and with a flick of the wrist pull it from his grasp or even break the blade.

DATE c.1660
ORIGIN ITALY
WEIGHT 1¾ LB (0.81 KG)
LENGTH 20 IN (50.8 CM)



FULL VIEW

Pommel



Wire-bound grip



Ring guard



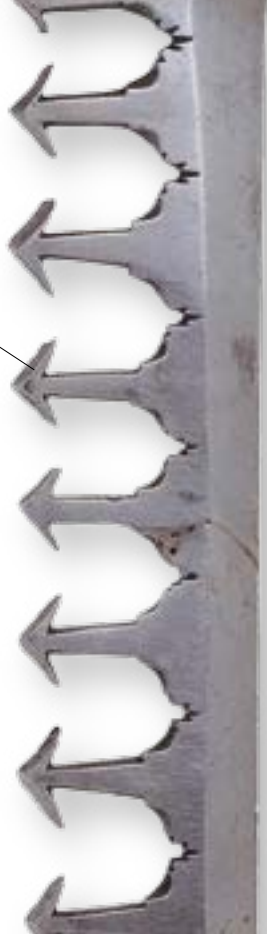
Elaborately decorated ricasso



FULL VIEW



Barbed head to trap sword blade



QUILLON DAGGER

This German dagger has straight quillons and a serrated blade with pierced fullers. It was used for parrying an opponent's blade.

DATE c.1600
ORIGIN GERMANY
WEIGHT 1½ LB (0.75KG)
LENGTH 19½ IN (50 CM)





QUILLON DAGGER

This weapon follows the conventions of a left-hand dagger: medium-length blade, wide and forward-facing quillons, and a ring guard to protect the hand.

DATE c.1600
ORIGIN GERMANY
WEIGHT ¾ LB (0.35 KG)
LENGTH 15¼ IN (39 CM)



GUNNER'S STILETTO

This specialist version of the stiletto dagger was used by artillerymen for a variety of battlefield tasks. These included measuring the bore of the gun and the size of the shot, tearing open cloth or paper cartridges, piercing the cartridge through the touch-hole, and cleaning out the touch-hole after firing.

DATE 18TH CENTURY
ORIGIN ITALY
WEIGHT ¼ LB (0.115 KG)
LENGTH 13½ IN (34 CM)



PLUG BAYONET

By inserting a knife handle into the muzzle of the gun, the infantryman was able to act as a pikeman against hostile cavalry after firing his musket. Plug bayonets did, of course, prevent the musket from being reloaded when fixed, and were later replaced by the socket bayonet.

DATE c.1665–85
ORIGIN EUROPE
WEIGHT ¾ LB (0.37 KG)
LENGTH 19 IN (48.2 CM)



SCABBARD TO PLUG BAYONET

This wooden scabbard is covered with parchment and tooled with herringbone and checkered ornamentation. On the front is a pocket for a small knife, and at the back are two lugs for suspension.

DATE c.1665–85
ORIGIN EUROPE
WEIGHT 1¼ OZ (35 G)
LENGTH 13 IN (33.3 CM)

ASIAN DAGGERS

FROM THE 16TH TO THE EARLY 18TH CENTURIES, when most of India was ruled by the Mughal Empire, the daggers of the Indian subcontinent were notable for their high-quality metalwork, ornamentation, and distinctive forms. Some daggers, such as the *kard*, were Islamic imports; others, including the *katar*, had specifically Indian roots. Daggers were worn by Indian princes and nobles for self-defense, for hunting, and for display. In combat, they were essential close-quarters weapons, capable of piercing the mail armor worn by Indian warriors.



INDIAN KARD

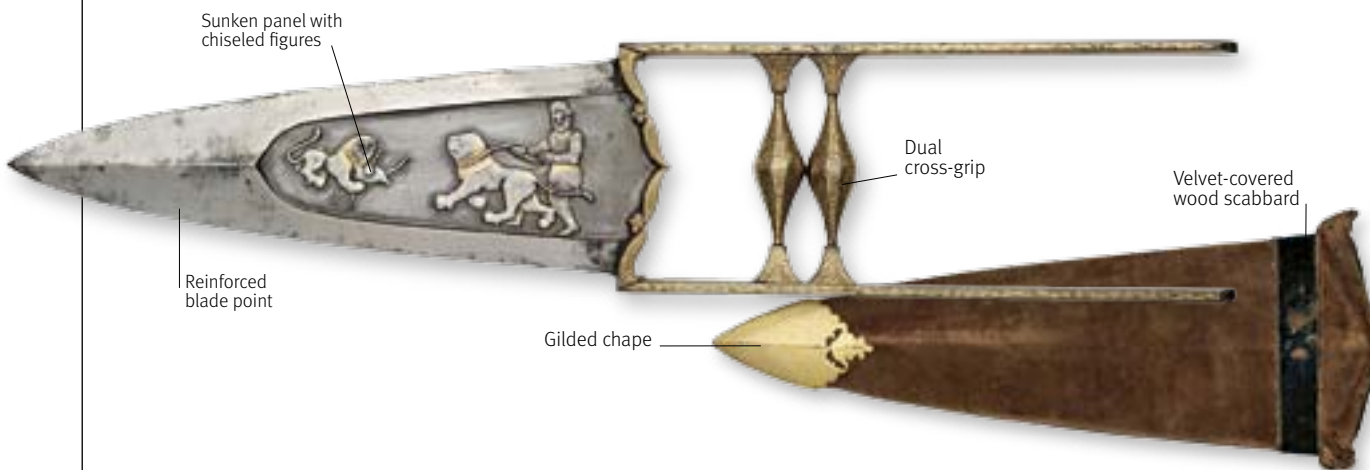
Of Persian origin, the straight-bladed, single-edged *kard* was in use across much of the Islamic world by the 18th century, from Ottoman Turkey to Mughal India. It was mostly used as a stabbing weapon. This example bears the name of its maker, Mohammed Baqir.

DATE 1710–11

ORIGIN INDIA

WEIGHT ¾ LB (0.34 KG)

LENGTH 15¼ IN (38.5 CM)



INDIAN KATAR

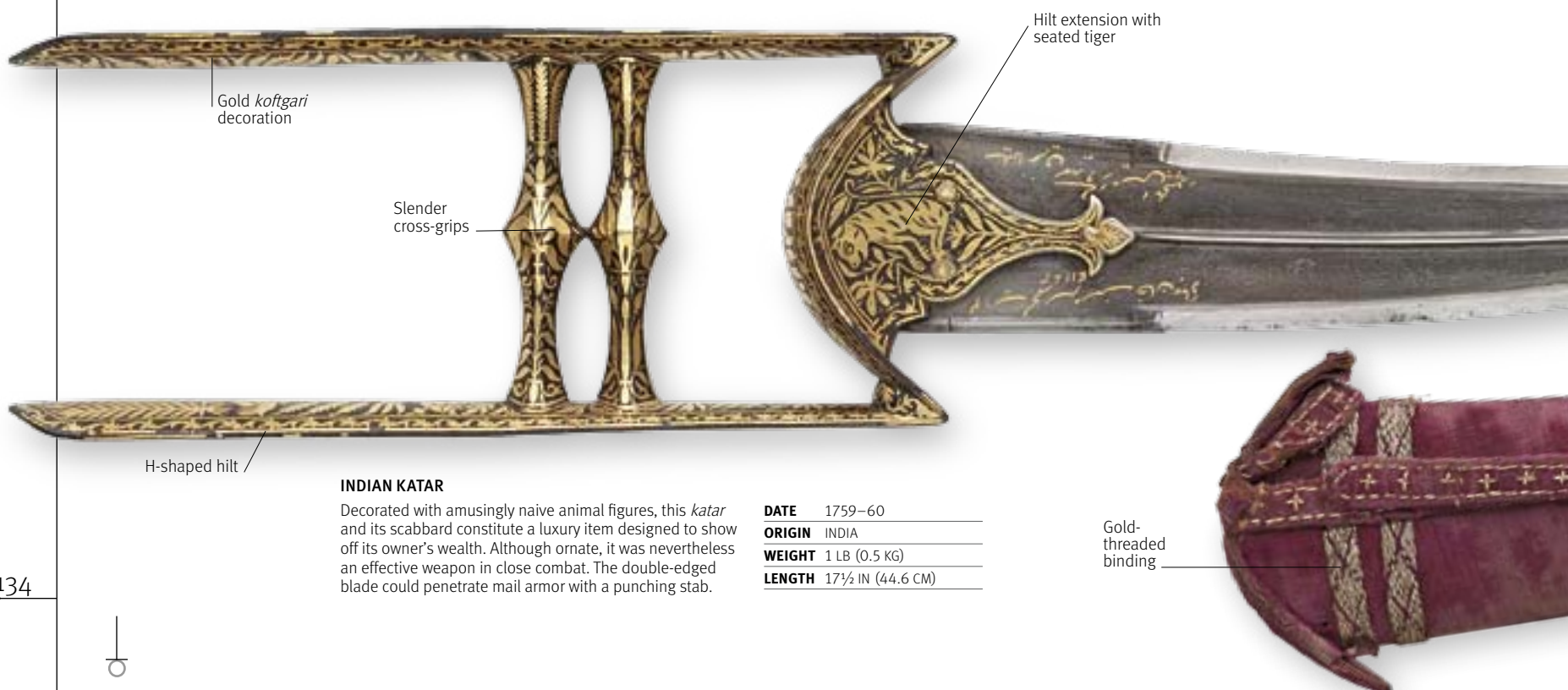
To use this north Indian dagger, the warrior grasped the cross-grips, making a fist, so that the sidebars of the hilt lay on either side of his hand and forearm. With the blade horizontal, he then stabbed with a punching motion. The *katar's* form changed little over hundreds of years; this example is from the 19th century.

DATE EARLY 19TH CENTURY

ORIGIN INDIA

WEIGHT 1¼ LB (0.57 KG)

LENGTH 16¾ IN (42.1 CM)



INDIAN KATAR

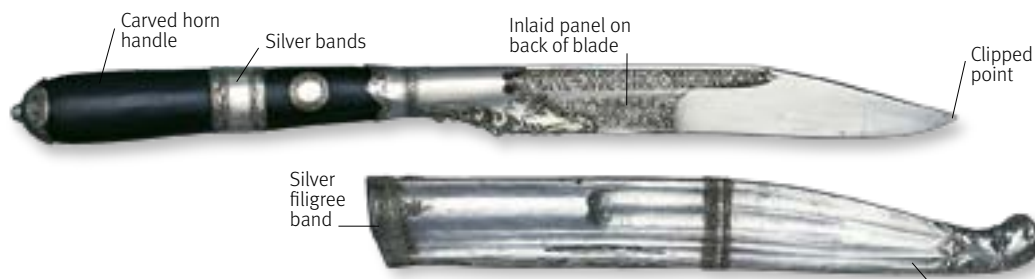
Decorated with amusingly naive animal figures, this *katar* and its scabbard constitute a luxury item designed to show off its owner's wealth. Although ornate, it was nevertheless an effective weapon in close combat. The double-edged blade could penetrate mail armor with a punching stab.

DATE 1759–60

ORIGIN INDIA

WEIGHT 1 LB (0.5 KG)

LENGTH 17½ IN (44.6 CM)



SRI LANKAN PIHA KAETTA

The broad-bladed, single-edged knife known as a *piha kaetta* is native to the island of Sri Lanka. Many were produced by the royal workshops. With lavish use of silver on both knife and scabbard, this fine example probably belonged to a courtier, noble, or high-ranking official.

DATE 18TH CENTURY
ORIGIN SRI LANKA
WEIGHT ½ LB (0.25 KG)
LENGTH 14¾ IN (36.5 CM)



BHUTANESE DAGGER

This straight-bladed dagger originated from the remote Himalayan kingdom of Bhutan, which has borders with Nepal and India. The hilt is chiseled with various Chinese symbols of good luck on a background of tendrils. The wooden scabbard has a border and chape of gilded iron.

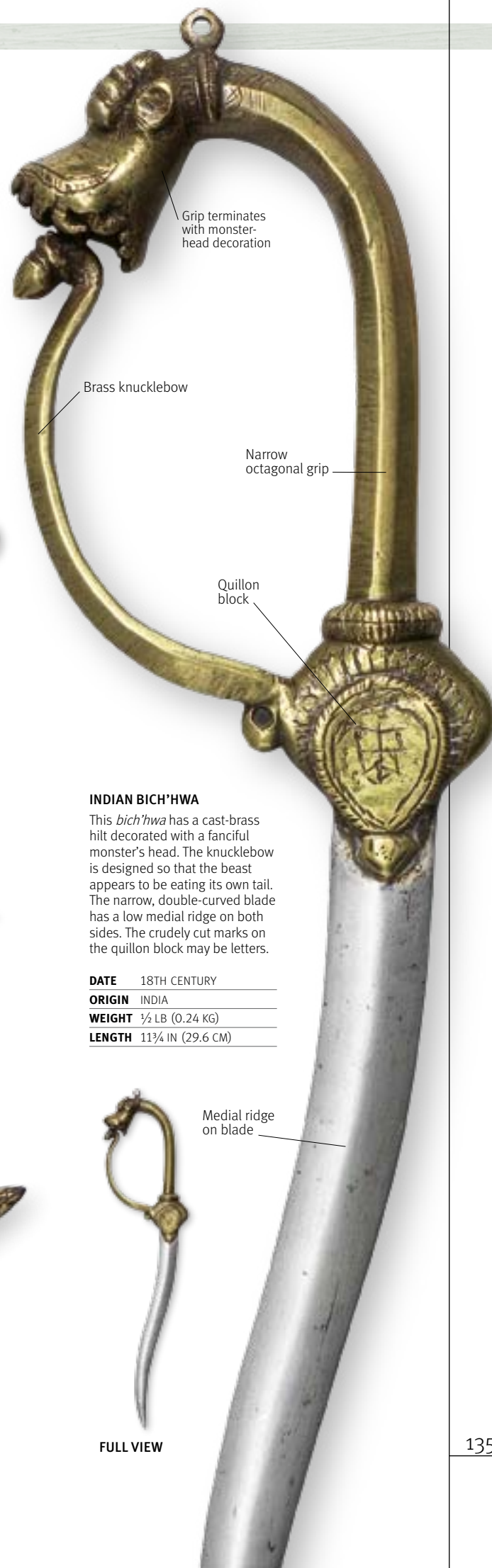
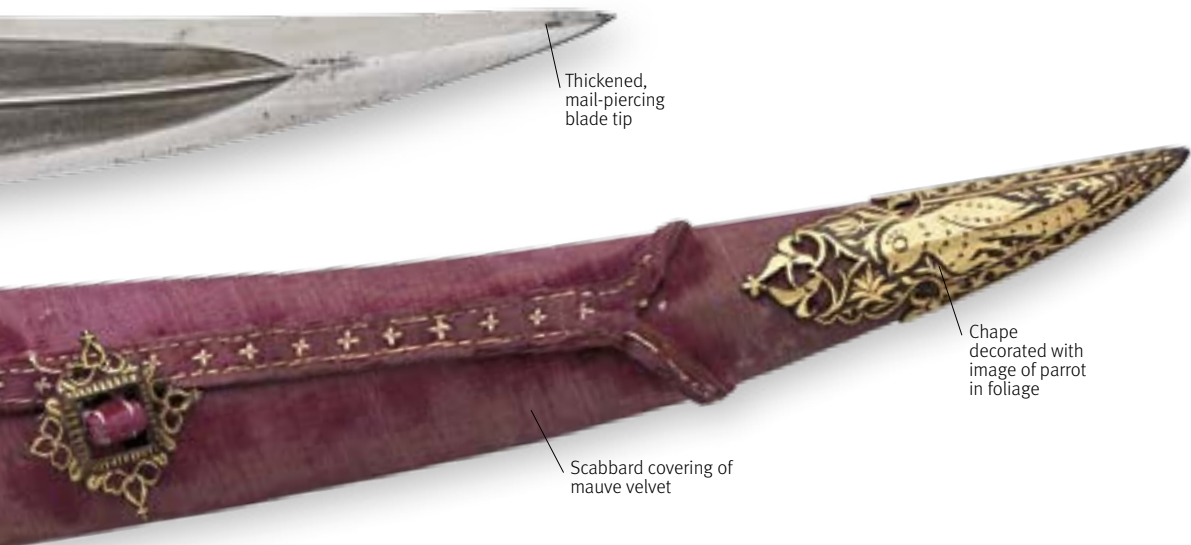
DATE 18TH CENTURY
ORIGIN BHUTAN
WEIGHT ¾ LB (0.35 KG)
LENGTH 17 IN (43.4 CM)



INDIAN BICH'HWA

Named after an Indian word for scorpion, and derived from the shape of an animal horn, the *bich'hwa* was a small but deadly dagger. In this example, the iron hilt, decorated in silver *koftgari* (form), is in the form of a flattened loop, attached to the blade by two rivets. The recurved blade is reinforced at the point to increase its penetration.

DATE 18TH CENTURY
ORIGIN INDIA
WEIGHT ½ LB (0.21 KG)
LENGTH 10¾ IN (27.2 CM)



INDIAN BICH'HWA

This *bich'hwa* has a cast-brass hilt decorated with a fanciful monster's head. The knucklebow is designed so that the beast appears to be eating its own tail. The narrow, double-curved blade has a low medial ridge on both sides. The crudely cut marks on the quillon block may be letters.

DATE 18TH CENTURY
ORIGIN INDIA
WEIGHT ½ LB (0.24 KG)
LENGTH 11¾ IN (29.6 CM)



FULL VIEW

EUROPEAN ONE-HANDED STAFF WEAPONS

SINGLE-HANDED STAFF weapons were primarily used by horsemen; their role was to fracture plate armor or do internal damage to an opponent. These were simple, brutal weapons, although the pick of the war hammer was useful in penetrating gaps in armor. Despite their clublike nature, many were carried by men of high birth and, as a result, were finely crafted with elaborate decoration.



Pick or spike

Socket with descending langets

Four-sided hammer

HORSEMAN'S HAMMER

The small, four-sided hammer is counterbalanced by a longer pick or spike that is also four-sided. The square-shaped socket extends into four langets that run down the sides of the wooden shaft. This war hammer would have been part of the armament of a cavalryman.

DATE 16TH CENTURY

ORIGIN GERMANY

WEIGHT 11¼ LB (5.4 KG)

LENGTH 21.5 IN (54.6 CM)



FULL VIEW



Shaped steel flange

Decorated steel shaft

Langet to protect shaft



Weave-pattern mace head

Steel shaft





MACE WITH FLANGED HEAD

From the late 15th century onward, most maces were made entirely from steel, with the head constructed from a number of flanges—seven was a common number—shaped with complex undulations and projections. Each flange would be brazed around a central tubular core.

DATE	16TH CENTURY
ORIGIN	EUROPE
WEIGHT	3½ LB (1.56 KG)
LENGTH	2¾ IN (63 CM)



MACE WITH CONICAL FINIAL

Made from steel, this mace has a conical finial fitted above seven flanges, each of which is drawn to a concave-sided point. The shaft is decorated with scrolling vine foliage in shallow relief. The flanged mace was the most common type of mace in use during the 16th century.

DATE	16TH CENTURY
ORIGIN	EUROPE
WEIGHT	1.56KG (3½LB)
LENGTH	60CM (23IN)



DECORATED MACE

This flanged mace is decorated with a foliate pattern along the length of the shaft and is topped by an upper finial (or terminal) in the shape of an acorn. The hole visible halfway along the steel shaft is for a wrist loop, especially important for mounted soldiers, so that if the mace fell out of the hand, it could easily be retrieved.

DATE	16TH CENTURY
ORIGIN	EUROPE
WEIGHT	3½ LB (1.56 KG)
LENGTH	25 IN (63 CM)



HORSEMAN'S HAMMER

Popular with cavalymen for smashing armor plate, war hammers were also used by those fighting on foot in tournaments. During the 16th century, the pick was increased in size and the hammer correspondingly reduced, suggesting greater primacy for the pick in combat.

DATE	16TH CENTURY
ORIGIN	EUROPE
WEIGHT	1¾ LB (0.82 KG)
LENGTH	8½ IN (21.5 CM)



MACE WITH INTERLACE HEAD

This unusual mace from Egypt features an interlace design on a bulbous head and is signed, in gold, by its maker. Maces increasingly became ceremonial objects in the 16th and 17th centuries—the British House of Commons continues to use a mace as a symbol of its authority.

DATE	15TH CENTURY
ORIGIN	EGYPT
WEIGHT	3½ LB (1.56 KG)
LENGTH	c.23½ IN (60 CM)



BATTLE OF PAVIA

The Habsburg defeat of France at the Battle of Pavia in 1525, is commemorated here in this contemporary tapestry. It was a battle in which the Imperial pikemen and arquebusiers of the Italian army proved effective against the advance of the armored French knights.



EUROPEAN TWO-HANDED STAFF WEAPONS

STAFF WEAPONS, ESPECIALLY when combined with bows, had proved highly effective against cavalry during the Middle Ages. In the 16th century, they continued to be the foot soldier's most effective weapon, although the bow was superseded by the musket. Swiss mercenaries popularized the halberd, which, in the hands of a strong man, was capable of smashing through plate armor: as was the poleax, the weapon favored by armored knights when fighting on foot. By the early 17th century, these weapons were being replaced by the pike, and used in a ceremonial capacity.

Steel spike

POLEAX

Popular in the 15th and 16th centuries with knights fighting on foot, the poleax comprised an axhead balanced by a hammer or fluke that was topped by a steel spike—all useful elements in penetrating plate armor. The weapon's name derives from the old English name for head, "poll."

DATE 16TH CENTURY

ORIGIN GERMANY

LENGTH 11 IN (28 CM)

Edged blade

Cutting edge

Fluke or spur

Hooked fluke

Motto Deus providebit
("God will provide")

Tapering socket

Hammer or fluke

DECORATED GLAIVE

The glaive was an infantry weapon with a large blade shaped like a kitchen knife. This is a particularly splendid example of a skilfully etched blade showing the firesteels of Burgundy surmounted by a crown and date. The intertwined double "M" represents the names Maximilian and Maria.

DATE 1564

ORIGIN GERMANY

LENGTH 27½ IN (70 CM)

Four-sided socket

BILL

Employed throughout Europe, the bill was especially popular in England, where it continued to be used well into the 17th century. The various spikes and flukes made it an effective parrying weapon. This example has two triangular spikes and a short triangular fluke.

DATE 16TH CENTURY

ORIGIN ENGLAND

LENGTH 19¼ IN (49 CM)

Axhead

Langet protecting wooden shaft

MORNING STAR

A peasant weapon common in Europe, the morning star consists of a head of wood or iron studded spikes. It was cheap and easy to manufacture, and useful against opponents without armor. Also known as a “holy water sprinkler,” most such weapons have a more bulbous head than this example.

DATE	17TH CENTURY
ORIGIN	EUROPE
LENGTH	23½ IN (60 CM)

BARDICHE

A weapon popular in Eastern Europe, the bardiche has a distinctive enlarged blade attached to the shaft through a socket, as well as at the bottom of the blade. This weapon has an elaborately fashioned, curved blade that suggests a ceremonial role.

DATE	c.16TH CENTURY
ORIGIN	RUSSIA
LENGTH	30¾ IN (78 CM)

Extended spike

Studded iron spikes

Crescent-shaped axe blade

Main spike

Wooden shaft

HALBERD

Originating in Switzerland, the halberd was used as an infantry weapon in much of Europe by the 16th century. A cleaverlike blade is backed by a lug or fluke. This Italian halberd is missing its langets and is distinguished by a particularly long and narrow spike.

DATE	c.1570–80
ORIGIN	ITALY
LENGTH	22 IN (56 CM)

CEREMONIAL HALBERD

This finely crafted and elaborately decorated halberd—carried by the personal guard of the Elector of Saxony—is indicative of the movement of staff weapons away from the battlefield to the court, where they were used in a ceremonial capacity.

DATE	c.1580–1620
ORIGIN	GERMANY
WEIGHT	22½ IN (57 CM)

Decorated blade

Spike with medial ridge

Axhead socket

Hooked fluke

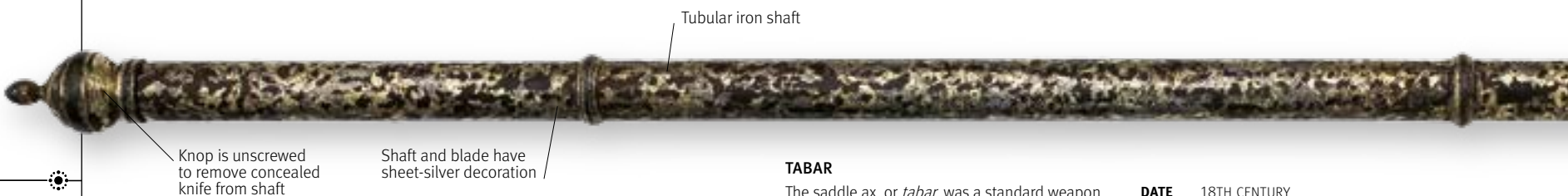
Attachment to blade

Decorated with the arms of Saxony

One of four langets

INDIAN AND SRI LANKAN STAFF WEAPONS

UNTIL THE 17TH CENTURY, the development of staff weapons in the Indian subcontinent was broadly similar to their evolution in Europe, although local Hindu traditions and the influence of Muslim invaders guaranteed that there were notable differences in design and decoration. Despite the adoption of Western-style firearms by Indian rulers, maces and axes remained in active use with Indian armies long after they had become obsolete in Europe, largely because Indian warriors continued to wear armor.



Knop is unscrewed to remove concealed knife from shaft

Shaft and blade have sheet-silver decoration

Tubular iron shaft

TABAR

The saddle ax, or *tabar*, was a standard weapon of Indian armies. This example is from Sind, in what is now Pakistan. The curved cutting edge concentrated the weight of a blow at a narrow point of impact. Unscrewing the knop at the base of the weapon revealed a slim knife, 21¼ in (54 cm) long, concealed inside the hollow shaft.

DATE 18TH CENTURY

ORIGIN SIND, INDIA

WEIGHT 2¾ LB (1.29 KG)

LENGTH 28 IN (71.3 CM)



Rounded flange ends in bird-head design

Iron shaft

CHILD'S MACE

With less than a tenth of the weight of a full-sized weapon and around a third of the length, this miniature mace was designed for use by a child. It may have been employed for early military training. The head has eight rounded flanges, and is topped by a small, ribbed knop.

DATE 18TH CENTURY

ORIGIN NORTHERN INDIA

WEIGHT ½ LB (0.22 KG)

LENGTH 13 IN (32.8 CM)



Dish pommel with fluted knop

Sword-like "basket" hilt

Iron shaft

FLANGED MACE

This mace, or *gorz*, has a knuckle guard in the "Hindu basket" style, as often seen on *khanda* swords. The eight spiral flanges on the head are sharpened to a cutting edge. The flanges focused the impact of a blow from this heavy weapon, making it effective even against armor.

DATE 18TH CENTURY

ORIGIN RAJASTHAN, INDIA

WEIGHT 5½ LB (2.55 KG)

LENGTH 33¾ IN (84.2 CM)



Rattan grip

Hand guard

SPIKED MACE

This mace resembles a more refined version of the "morning star" maces of 16th-century Europe. The grip of the spikes prevented curved armor from deflecting blows. With its fine decoration, this weapon was designed as much to show its owner's wealth and status as it was for combat.

DATE EARLY 18TH CENTURY

ORIGIN DELHI, INDIA

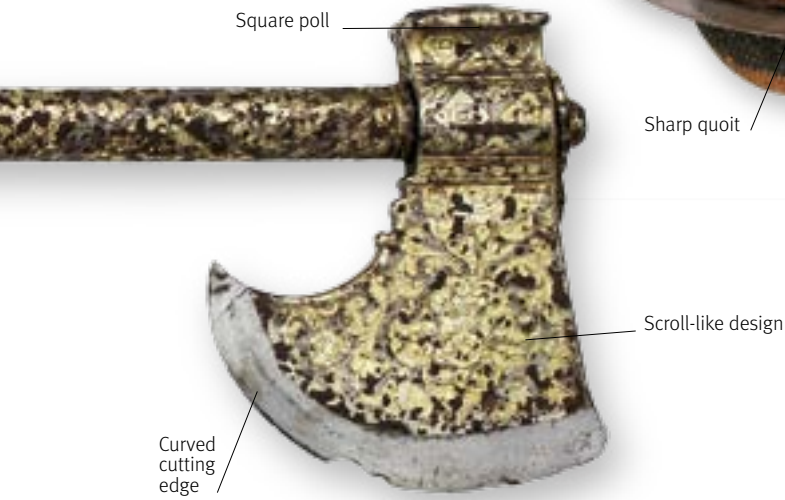
WEIGHT 5½ LB (2.5 KG)

LENGTH 33½ IN (85 CM)

FLAIL WITH QUOITS

This flail, or *cumberjung*, was made in Gujarat when the area was under the rule of the Hindu Maratha Empire. The shaft was manipulated to send the sharp-edged quoits scything through the air. It was a fearsome weapon in close combat, but considerable skill was required to use it effectively.

DATE 18TH CENTURY
ORIGIN GUJRAT, INDIA
WEIGHT 2¼ LB (1.05 KG)
LENGTH SHAFT: 18½ IN (46.8 CM)



ELEPHANT GOAD

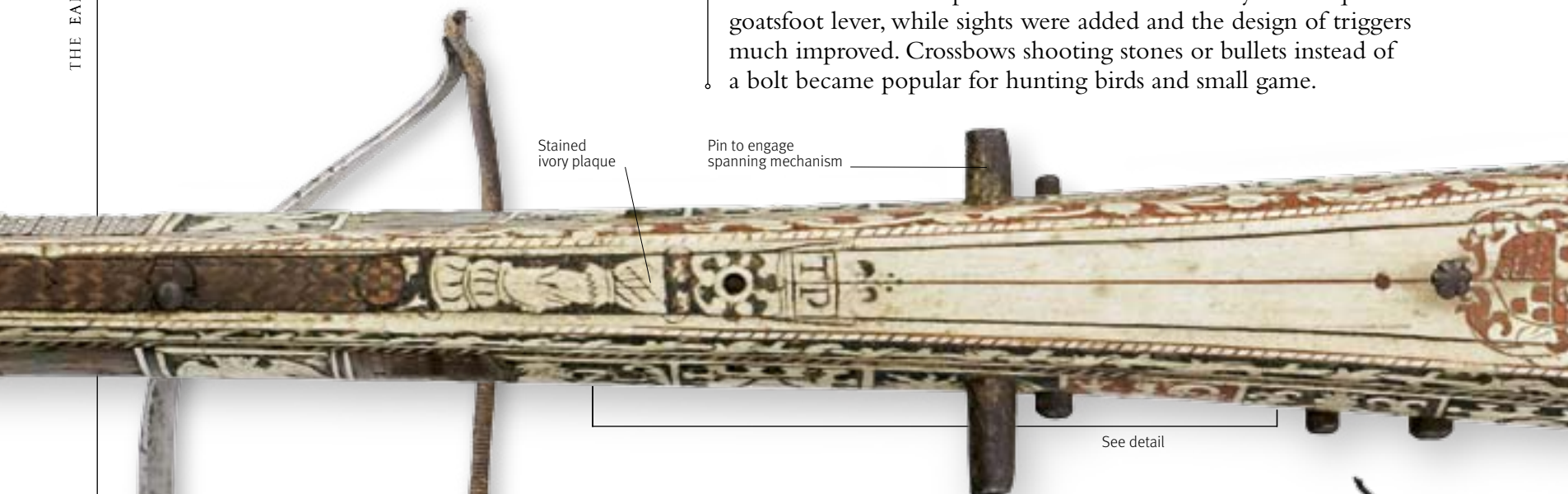
This elaborately decorated goad, or *ankus*, was used to train and control elephants by applying pressure to parts of their skin with the hook or spike. Elephants were commonly employed on Indian battlefields from ancient times up to the 19th century, so goads were often found in armories. In the heat of battle, they would presumably also have served as weapons.

DATE 18TH CENTURY
ORIGIN SRI LANKA
WEIGHT 3¾ LB (1.7 KG)
LENGTH 36½ IN (93 CM)



EUROPEAN CROSSBOWS

DURING THE COURSE OF the 16th century crossbows disappeared from European battlefields, supplanted by gunpowder weapons, but they continued to be widely employed for hunting and for shooting competitions. The use of spring steel for the lath became almost universal; steel bows were easier to make than composite bows and achieved impressive consistency. Built-in spanning levers allowed archers to dispense with the need to carry a cranequin or goatsfoot lever, while sights were added and the design of triggers much improved. Crossbows shooting stones or bullets instead of a bolt became popular for hunting birds and small game.



Stained ivory plaque

Pin to engage spanning mechanism

See detail

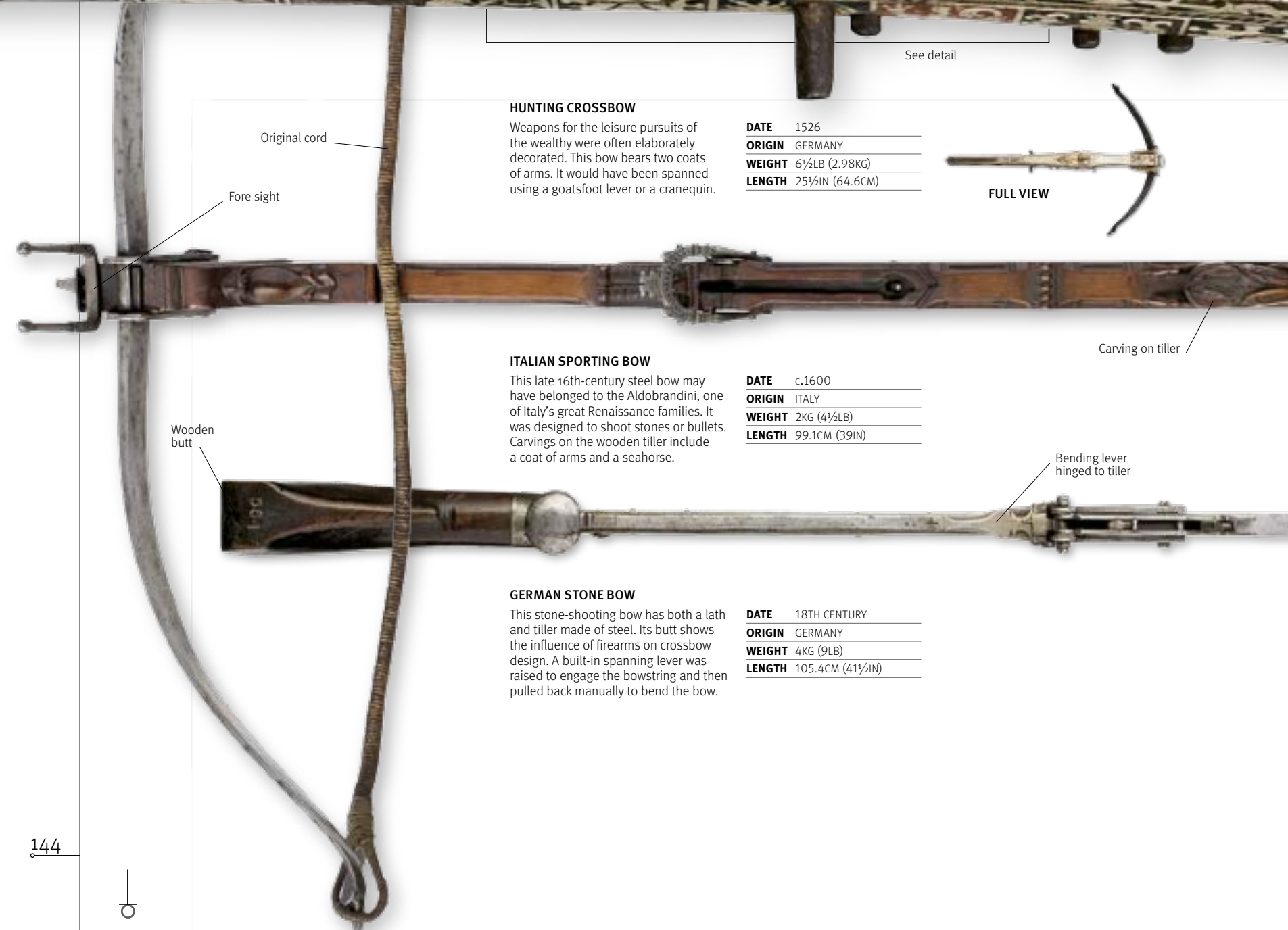
HUNTING CROSSBOW

Weapons for the leisure pursuits of the wealthy were often elaborately decorated. This bow bears two coats of arms. It would have been spanned using a goatsfoot lever or a cranequin.

DATE	1526
ORIGIN	GERMANY
WEIGHT	6½LB (2.98KG)
LENGTH	25½IN (64.6CM)



FULL VIEW



Original cord

Fore sight

Wooden butt

ITALIAN SPORTING BOW

This late 16th-century steel bow may have belonged to the Aldobrandini, one of Italy's great Renaissance families. It was designed to shoot stones or bullets. Carvings on the wooden tiller include a coat of arms and a seahorse.

DATE	c.1600
ORIGIN	ITALY
WEIGHT	2KG (4½LB)
LENGTH	99.1CM (39IN)

Carving on tiller

Bending lever hinged to tiller

GERMAN STONE BOW

This stone-shooting bow has both a lath and tiller made of steel. Its butt shows the influence of firearms on crossbow design. A built-in spanning lever was raised to engage the bowstring and then pulled back manually to bend the bow.

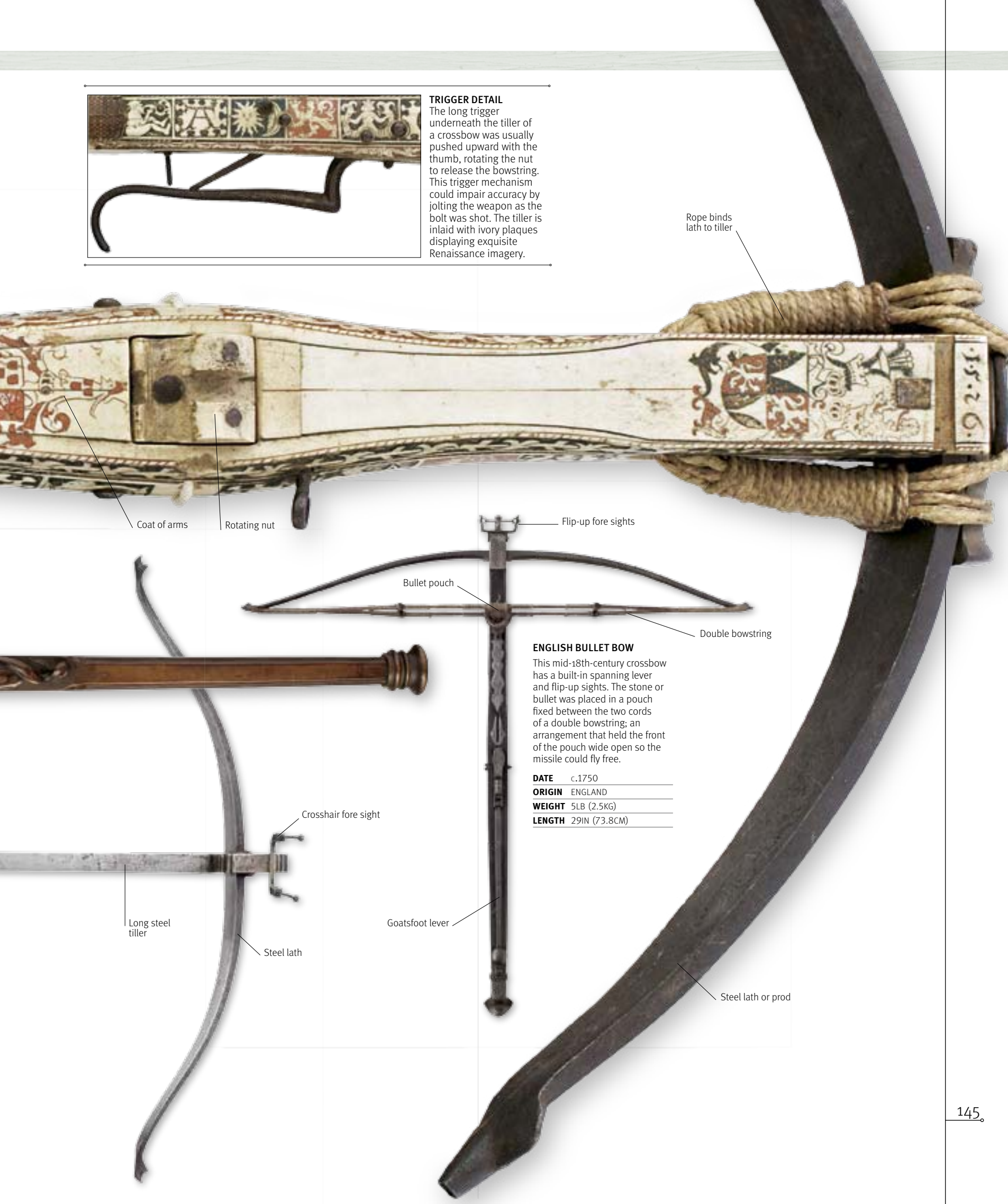
DATE	18TH CENTURY
ORIGIN	GERMANY
WEIGHT	4KG (9LB)
LENGTH	105.4CM (41½IN)





TRIGGER DETAIL

The long trigger underneath the tiller of a crossbow was usually pushed upward with the thumb, rotating the nut to release the bowstring. This trigger mechanism could impair accuracy by jolting the weapon as the bolt was shot. The tiller is inlaid with ivory plaques displaying exquisite Renaissance imagery.



Rope binds lath to tiller

Coat of arms

Rotating nut

Flip-up fore sights

Bullet pouch

Double bowstring

ENGLISH BULLET BOW

This mid-18th-century crossbow has a built-in spanning lever and flip-up sights. The stone or bullet was placed in a pouch fixed between the two cords of a double bowstring; an arrangement that held the front of the pouch wide open so the missile could fly free.

DATE c.1750

ORIGIN ENGLAND

WEIGHT 5LB (2.5KG)

LENGTH 29IN (73.8CM)

Crosshair fore sight

Long steel tiller

Steel lath

Goatsfoot lever

Steel lath or prod

ASIAN BOWS

OFTEN SHOT FROM HORSEBACK, bows were central to Asian warfare. Although the Chinese were the inventors of the crossbow, laminated and composite bows predominated. Laminated bows were made from several layers of wood glued together. In composite bows, the layers were of different materials, usually horn, wood, and sinew. The strips of horn formed the belly of the bow, closest to the archer, with sinew used for the back and a wooden core sandwiched between the two. By exploiting the contrasting properties of these materials, bows of relatively small size achieved remarkable strength and power.

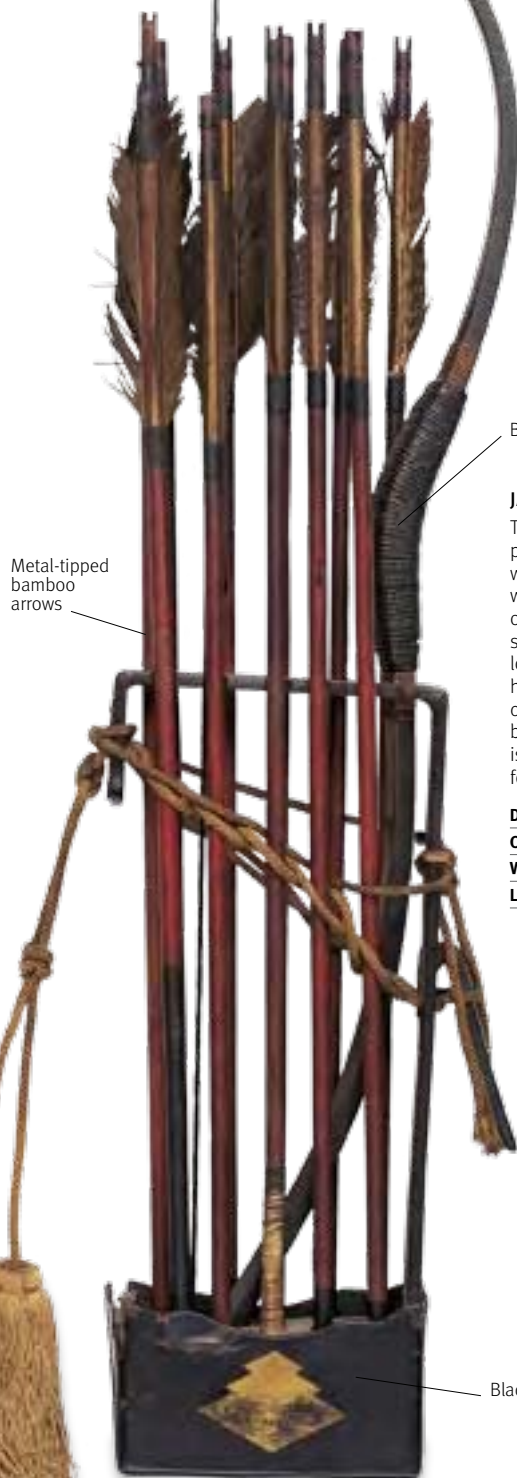
Nock cut into scroll at end of bow
Silk bowstring
Bow made of whalebone



CHINESE COMPOSITE BOW

This is a typical Chinese-Mongolian composite bow made from horn, wood, and sinew. When the bow is unstrung, its limbs relax forward. Stringing the bow usually requires two people, one of whom hooks the bowstring in the nocks while the other pulls the limbs backward into the recurved shape. The Indian bow shown on the right illustrates how a recurved bow looks when strung.

DATE	18TH CENTURY
ORIGIN	CHINA
WEIGHT	1½ LB (0.68 KG)
LENGTH	31 IN (80 CM) UNSTRUNG



Black-cord grip

JAPANESE PALANQUIN BOW

The Japanese bow—the original prime weapon of samurai warriors—was typically made from laminated wood, but this example is made of whalebone. Despite its length, similar to that of an English longbow, it was often shot from horseback. The grip was not central, but placed closer to the bottom of the bow. This example is a small palanquin bow intended for ceremonial use.

DATE	18TH CENTURY
ORIGIN	JAPAN
WEIGHT	¼ LB (0.15 KG)
LENGTH	24¾ IN (63 CM) STRUNG

Black lacquered box



Both bowcase and quiver hang from a silk belt

Leather quiver covered in purple velvet

Case for carrying composite bow

CHINESE BOWCASE AND QUIVER

This bowcase (*gongdai*) and quiver (*jiatong*) are made from leather covered with purple velvet, with added decorative leather shapes cut out on top. The bowcase is shaped to hold a composite bow. Folded layers of thick red felt inside the quiver would have helped to retain the arrows.

DATE	19TH CENTURY
ORIGIN	CHINA
WEIGHT	CASE 1½ LB (0.64 KG)
LENGTH	20¾ IN (53 CM)



FULL VIEW

Ear of bow

See detail

Bow string

Grip painted green and gold

Limb

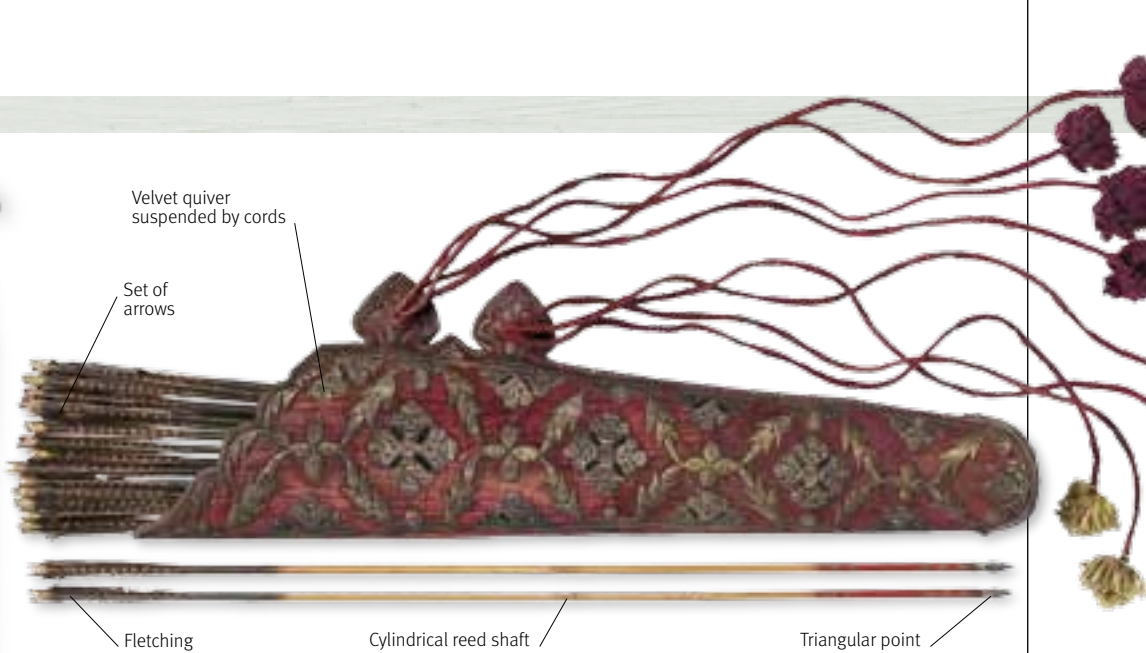
NOCK DETAIL

The nock holding the bowstring was typically made from horn. The string itself is of silk with loops of sinew. As the bow is drawn, the rigid "ears" act as levers, making drawing easier. On release of the arrow, the inertia of the ears gives a final snap to the string as the arrow leaves the bow.

INDIAN COMPOSITE BOW

This bow from northern India is made from horn strips glued to a wooden core, the whole backed with sinew. Horn, which forms the belly of the bow, resists compression, whereas the sinew on the back of the bow is strong under tension. The deeply curved limbs have long, recurved ears.

DATE 18TH CENTURY
ORIGIN NORTHERN INDIA
WEIGHT 1 LB (0.55 KG)
LENGTH 37½ IN (95 CM) STRUNG



Velvet quiver suspended by cords

Set of arrows

Fletching

Cylindrical reed shaft

Triangular point

INDIAN QUIVER AND ARROWS

This 18th-century Maratha quiver is covered in red velvet, and decorated with leaf and flower motifs in gold and silver embroidery. Suspended from two sets of four cords, it contains 28 arrows, all equipped with reed shafts, triangular-section points, nocks to fit on the bowstring, and long flights of gray or off-white feathers.

DATE 18TH CENTURY
ORIGIN INDIAN
WEIGHT QUIVER 1 LB (0.44 KG)
LENGTH QUIVER 25¾ IN (65.5 CM)



INDIAN ARROWS

These arrows are made of bamboo. The shaft is gilded and painted with pink roses, the heads are of various patterns: (top) blunt octagonal, (middle) flat-sided triangular, and (bottom) large, flat-sided triangular.

DATE 18TH CENTURY
ORIGIN NORTHERN INDIA
WEIGHT HEAD 1 OZ (35 G)
LENGTH 30 IN (73.5 CM)

INDIAN THUMB RING

In Asian archery, it was traditional to draw the bowstring with the thumb. To help with the pressure imposed on the digit, most archers wore a thumb ring. This was most often made from animal horn, although jade was sometimes used, as in this ring from Mughal India. The ring was worn with the extension for holding the bowstring on the grip side of the thumb. The arrow, nocked to the string, rested on top of the thumb.

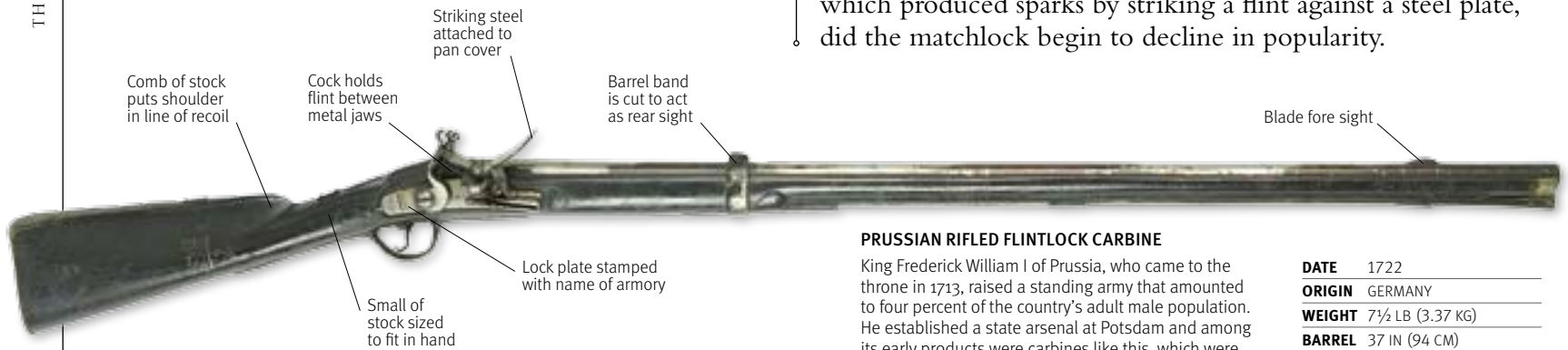
DATE 18TH CENTURY
ORIGIN INDIA
WEIGHT ½ OZ (16 G)
LENGTH 1¼ IN (3.5 CM)

Extension holds bowstring

Jade ring

MATCHLOCK AND FLINTLOCK LONG GUNS

THE MATCHLOCK WAS AN EARLY firing mechanism, or “lock,” for hand-held guns. Pulling the trigger plunged a smouldering match into a pan containing a tiny gunpowder charge, or primer. The primer ignited, sending a flash through a small touch hole in the barrel wall to set off the main charge. The matchlock was far simpler than the wheellock, its contemporary, which ignited the primer with sparks struck from a piece of iron pyrites by a spinning wheel. Only with the development of the flintlock, which produced sparks by striking a flint against a steel plate, did the matchlock begin to decline in popularity.



PRUSSIAN RIFLED FLINTLOCK CARBINE

King Frederick William I of Prussia, who came to the throne in 1713, raised a standing army that amounted to four percent of the country's adult male population. He established a state arsenal at Potsdam and among its early products were carbines like this, which were manufactured from 1722 to 1774. Ten men in each squadron of cuirassiers were issued with rifled weapons.

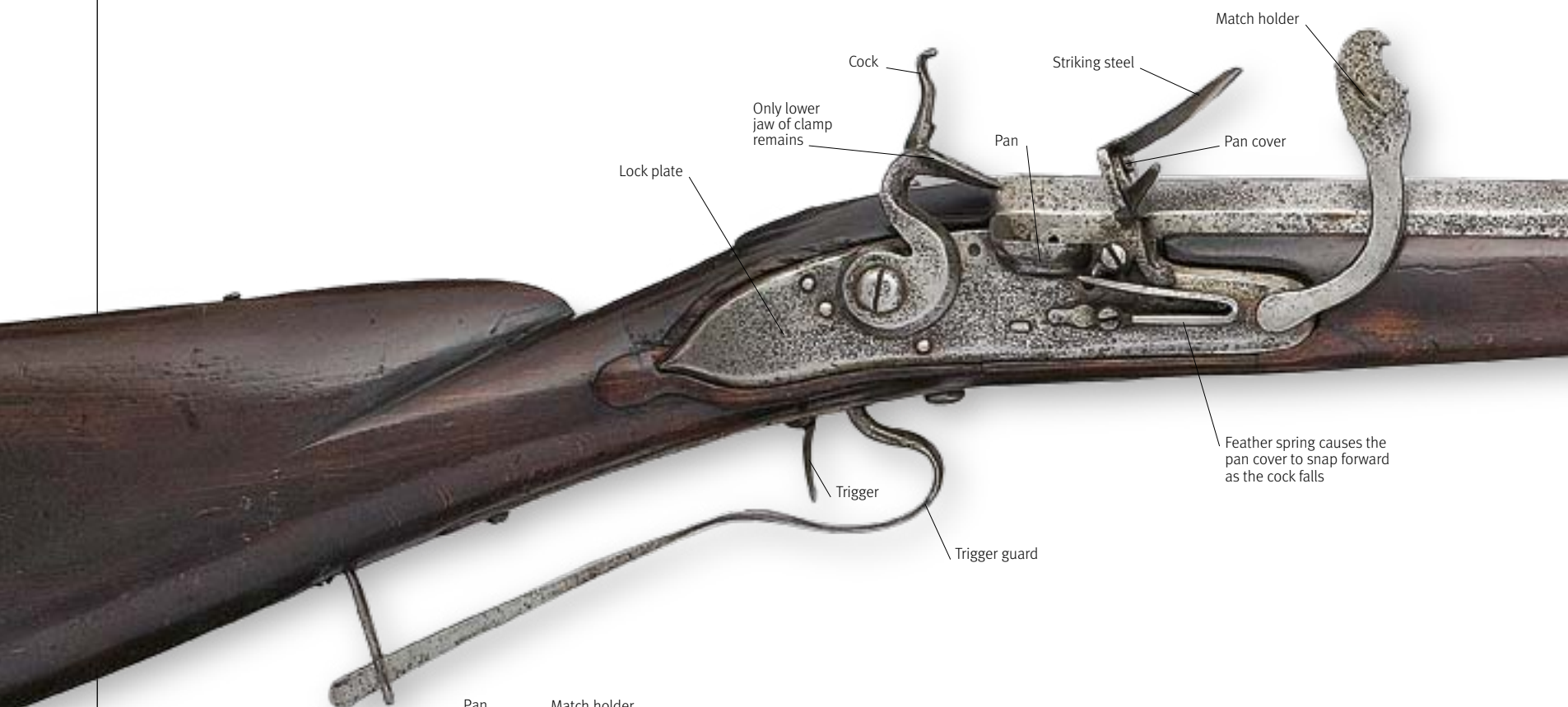
DATE 1722

ORIGIN GERMANY

WEIGHT 7½ LB (3.37 KG)

BARREL 37 IN (94 CM)

CALIBER 15-BORE



ENGLISH MATCHLOCK MUSKET

Muskets like this featured prominently in the English Civil War, from the first encounter between Royalists and Parliamentarians at Edgehill in 1642, to its conclusion at Worcester in 1651. Because matchlocks took so long to load, musketeers were extremely vulnerable, particularly to cavalry, and had to be protected by pikemen.

DATE c.1640

ORIGIN ENGLAND

WEIGHT 9¼ LB (4.2 KG)

BARREL 45½ IN (115.5 CM)

CALIBER 11-BORE



Lock plate
Pan cover
Match holder
Barrel is octagonal for first third of length, then round
Small of stock fits in hand

BRITISH MATCHLOCK

By the end of their period of dominance, the best matchlocks had acquired a simple sophistication, at least in their finish. They had also become much lighter, and thus were considerably easier to handle. A high-quality piece such as this would have been a prime contender for conversion into a snaphaunce or flintlock, had it not been preserved in a collection.

DATE 17TH CENTURY
ORIGIN ENGLAND
WEIGHT 10½ LB (4.73 KG)
BARREL 46 IN (117.2 CM)
CALIBER 18 MM



Butt is bound with brass
Lock plate stamped with maker's name
Cock
Striking steel
Ramrod pipe
Sling swivel
Feather spring
Forestock sized to fit in hand

LONG LAND-PATTERN FLINTLOCK MUSKET

This modified version of the original Land-Pattern Musket, or "Brown Bess," was issued in 1742. It had a new trigger guard, a more pronounced comb to the stock, and a bridle linking the flashpan with the screw that secured the combined striker and pan cover. This example by Tippin is a "sealed pattern," meaning that it was retained in the Tower of London Armory as a model for other gunmakers producing this type of musket.

DATE 1742
ORIGIN ENGLAND
WEIGHT 10¾ LB (4.7 KG)
BARREL 46 IN (116.8 CM)
CALIBER 10-BORE



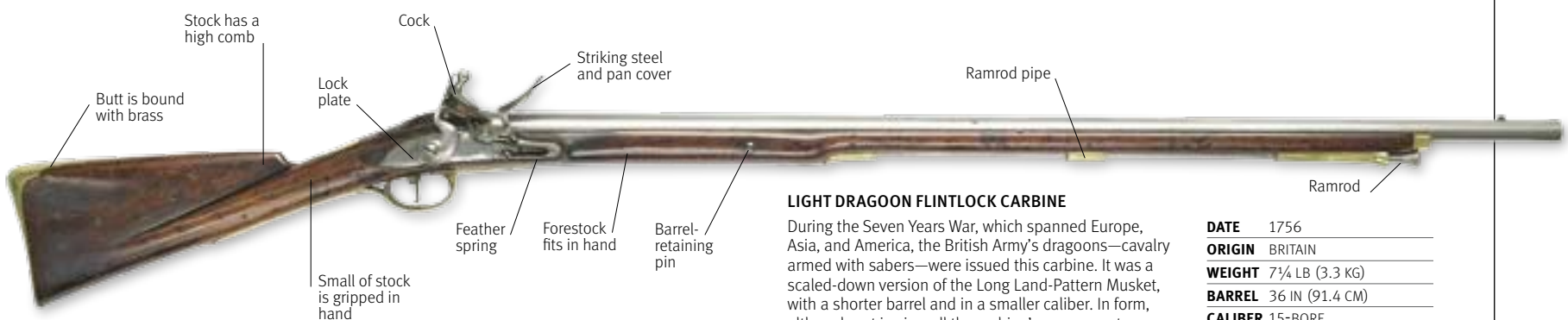
Rear sight
Ramrod pipe

FULL VIEW

DUTCH COMBINATION LONG GUN

This unusual musket is fitted with both a flintlock and a matchlock mechanism. The matchlock pan is part of the top of the striking steel. The flintlock is operated by the trigger guard, while the operation of the matchlock is by means of the trigger.

DATE 17TH CENTURY
ORIGIN NETHERLANDS
WEIGHT 15 LB (6.8 KG)
BARREL 46 IN (117 CM)
CALIBER 0.9 IN



Stock has a high comb
Butt is bound with brass
Lock plate
Cock
Striking steel and pan cover
Ramrod pipe
Small of stock is gripped in hand
Feather spring
Forestock fits in hand
Barrel-retaining pin

LIGHT DRAGOON FLINTLOCK CARBINE

During the Seven Years War, which spanned Europe, Asia, and America, the British Army's dragoons—cavalry armed with sabers—were issued this carbine. It was a scaled-down version of the Long Land-Pattern Musket, with a shorter barrel and in a smaller caliber. In form, although not in size, all the carbine's components are identical with those of the musket.

DATE 1756
ORIGIN BRITAIN
WEIGHT 7¼ LB (3.3 KG)
BARREL 36 IN (91.4 CM)
CALIBER 15-BORE

MATCHLOCK MUSKET

THE INVENTION OF THE MATCHLOCK *hackenbüsche*, or “arquebus,” can not be dated precisely, but evidence points to it having taken place sometime around 1475, probably in Germany. Technically, matchlocks were superseded with the invention of the wheellock in the 16th century, but they continued to be employed until the end of the 17th century, largely due to their simplicity.

Comb of stock assists in bringing shoulder to axis of recoil

Iron lock cover

Trigger

Trigger guard

Plain spout without measuring device

Sling is decorative as well as functional

MATCHLOCK MUSKET

While the matchlock was a significant improvement over the hand-cannon, it was still a very clumsy weapon. Even in dry weather the match could be extinguished all too easily, and its glowing end was a giveaway at night. However, the best models were surprisingly accurate and were capable of killing a man at a hundred yards or more.

DATE MID-17TH CENTURY

ORIGIN UK

WEIGHT 13¾LB (6.05KG)

BARREL 49½IN (125¾CM)

CALIBER .75IN

POWDER FLASK

The earliest powder flasks were fabricated from wood or leather. They often had a pricker attached for clearing the gun's touch-hole, but there was no mechanism for measuring the charge.

LEAD BALL

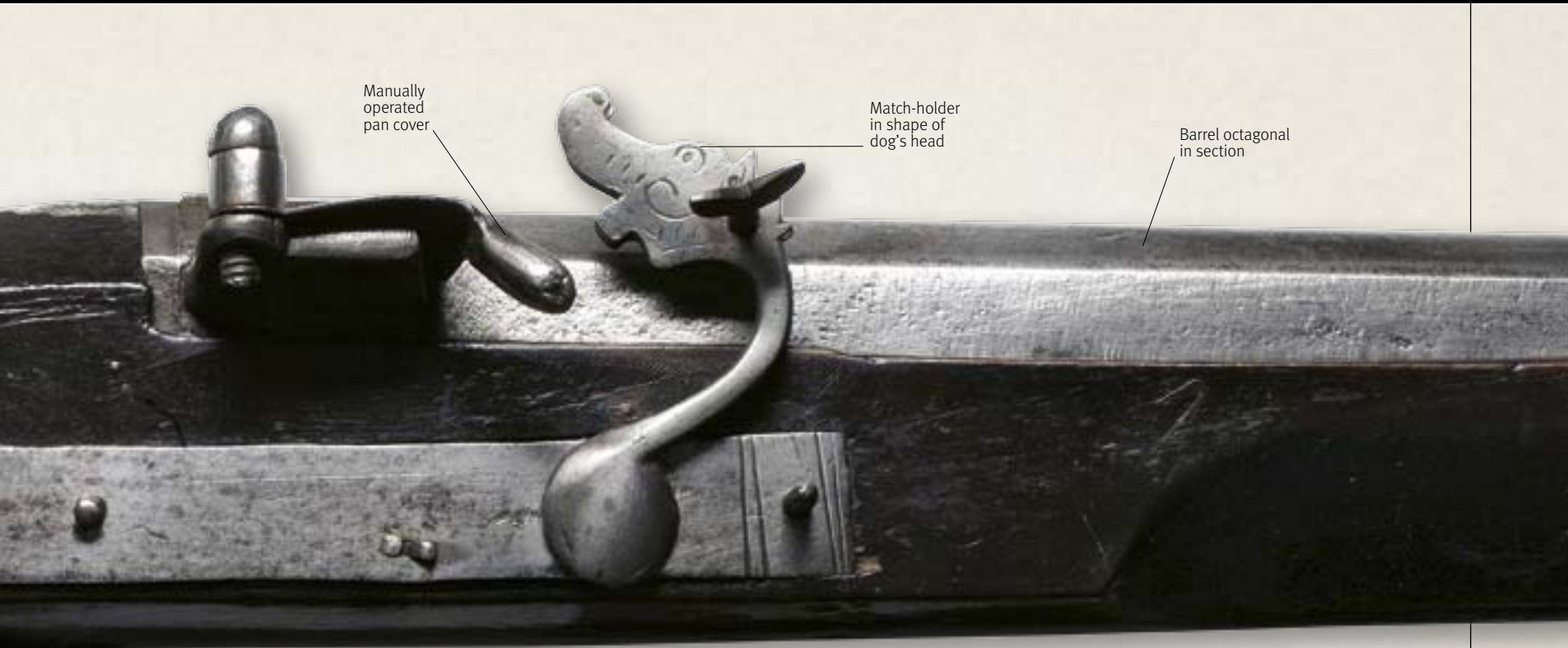
It was not until about 1600 that lead, with its low melting point and high specific gravity, became the universal material for bullets. Earlier, with armor still commonplace, iron balls had often been used.

MUSKET REST

The earliest military matchlocks were massive, and required the use of a rest. Of course, the rest itself had to be of sturdy design, and this increased the gunner's load. By about 1650, guns had become light enough for rests to be dispensed with.



WEAPON SHOWCASE



Manually operated pan cover

Match-holder in shape of dog's head

Barrel octagonal in section



FULL VIEWS

POWDER BELT

In addition to carrying a powder flask, a musketeer might have worn a belt from which small flasks, each filled with a measured charge of powder, were suspended.

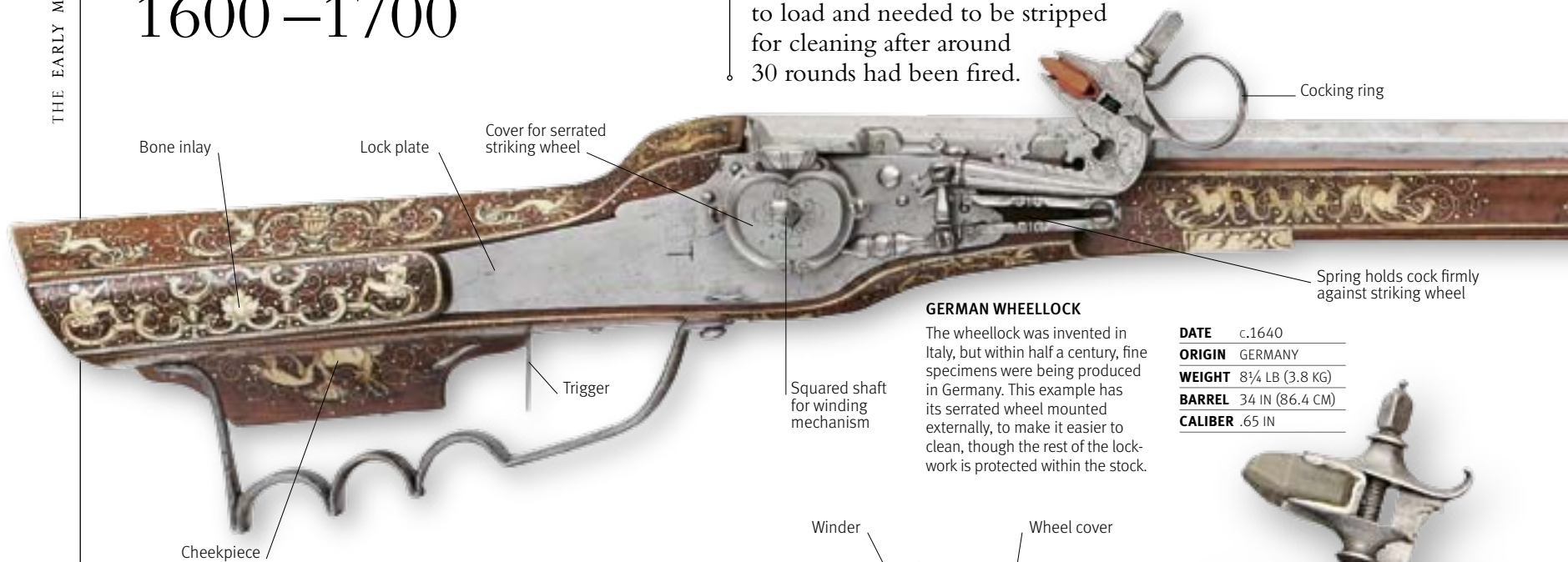
Leather belt



Flask is carved from wood

EUROPEAN HUNTING GUNS 1600–1700

HUNTING, BOTH FOR SPORT and for the pot, became far more predictable with the introduction of firearms, and by the early 17th century, the wheellock had become commonplace within the ranks of the landed gentry. Rifled wheellocks from this period were useful against even small game such as rabbits, but were slow to load and needed to be stripped for cleaning after around 30 rounds had been fired.



GERMAN WHEELLOCK

The wheellock was invented in Italy, but within half a century, fine specimens were being produced in Germany. This example has its serrated wheel mounted externally, to make it easier to clean, though the rest of the lockwork is protected within the stock.

DATE	c.1640
ORIGIN	GERMANY
WEIGHT	8¼ LB (3.8 KG)
BARREL	34 IN (86.4 CM)
CALIBER	.65 IN

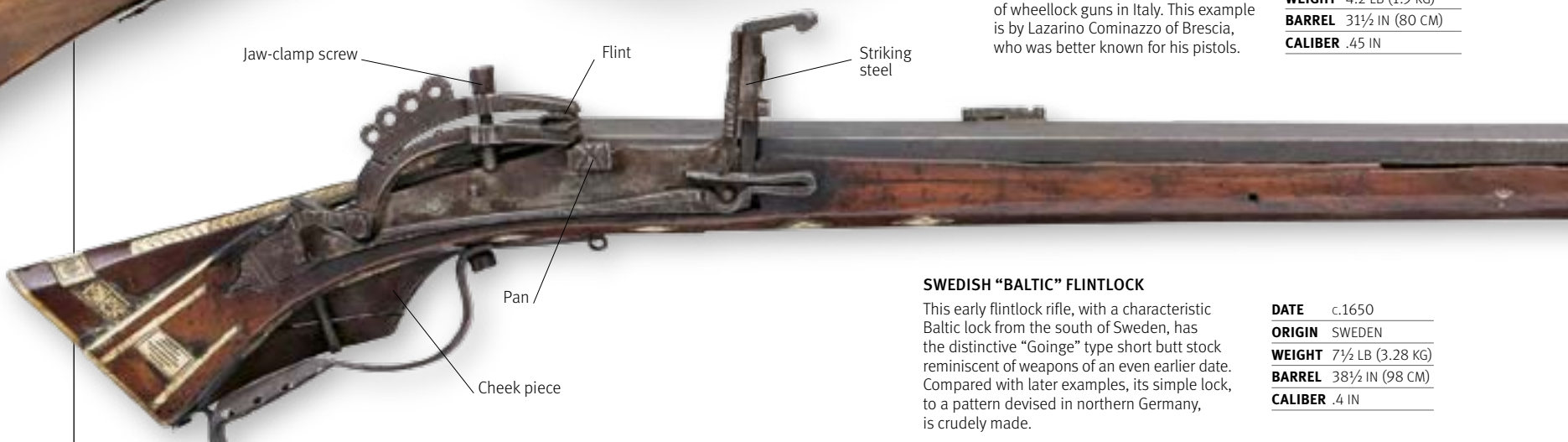


FULL VIEW

ITALIAN WHEELLOCK

By the 17th century, the northern cities of Brescia and Bologna had long become the centers for the fabrication of wheellock guns in Italy. This example is by Lazarino Cominazzo of Brescia, who was better known for his pistols.

DATE	c.1630
ORIGIN	ITALY
WEIGHT	4.2 LB (1.9 KG)
BARREL	31½ IN (80 CM)
CALIBER	.45 IN



SWEDISH "BALTIC" FLINTLOCK

This early flintlock rifle, with a characteristic Baltic lock from the south of Sweden, has the distinctive "Goinge" type short butt stock reminiscent of weapons of an even earlier date. Compared with later examples, its simple lock, to a pattern devised in northern Germany, is crudely made.

DATE	c.1650
ORIGIN	SWEDEN
WEIGHT	7½ LB (3.28 KG)
BARREL	38½ IN (98 CM)
CALIBER	.4 IN

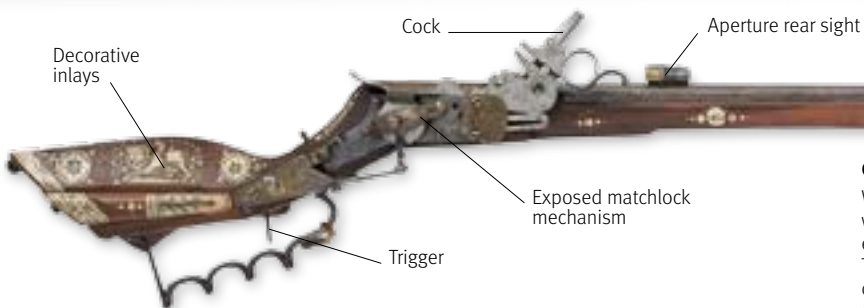


Lock plate
Steel
Revolving breech
Powder and shot magazines in butt stock

ITALIAN REPEATING FLINTLOCK

Italian gunmaker Michele Lorenzoni lived in Florence from 1683–1733, and invented an early form of repeating breech-loading flintlock. Paired magazines, one for powder and the other for shot, were located in the butt stock, and the breech block was rotated for charging by means of a lever on the left side of the gun.

DATE c.1690
ORIGIN ITALY
WEIGHT 8½ LB (3.95 KG)
BARREL 35 IN (89 CM)
CALIBER .53 IN

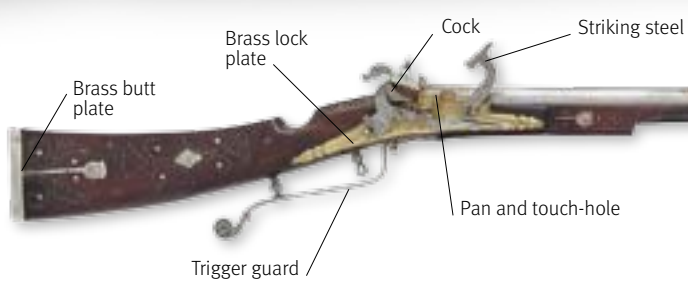


Cock
Aperture rear sight
Decorative inlays
Exposed matchlock mechanism
Trigger

GERMAN WHEELLOCK

Wheellocks exist in three basic forms: fully enclosed; with the wheel exposed but with the rest of the lock enclosed; and with the entire mechanism exposed. The latter form, known as a "Tschinke," from where it was devised, is more easily damaged but easier to clean and maintain. This example was made in Silesia, and its stock is inlaid with horn and mother-of-pearl.

DATE c.1630
ORIGIN GERMANY
WEIGHT 7¼ LB (3.4 KG)
BARREL 37 IN (94 CM)
CALIBER .33 IN



Barrel fixing pin

Brass butt plate
Brass lock plate
Cock
Striking steel
Pan and touch-hole
Trigger guard

SCOTTISH SNAPHAUNCE

The name snaphaunce derives from the Dutch *schnapp-hahn*, meaning "pecking hen," which it was thought to resemble. It was the first attempt to simplify the wheellock's method of striking sparks from a piece of iron pyrites. This superb example is attributed to Alison of Dundee, and was a gift from James to Louis XIII of France.

DATE 1614
ORIGIN SCOTLAND
WEIGHT 4¼ LB (2 KG)
BARREL 38 IN (96.5 CM)
CALIBER .45 IN



Striking steel
Fore stock
Fore sight
Pan and touch-hole
Silver-wire inlay
Ramrod thimble

ENGLISH FLINTLOCK

Andrew Dolep was a Dutch gunmaker who settled in London and set up shop near Charing Cross. He produced this magnificent flintlock—its walnut stock extensively inlaid with silver wire—toward the end of his career. Dolep is credited with the design of the "Brown Bess" musket, which this gun resembles.

DATE 1690
ORIGIN ENGLAND
WEIGHT 7 LB (3.2 KG)
BARREL 96½ CM (38 IN)
CALIBER .75 IN

EUROPEAN HUNTING GUNS FROM 1700

THE GAP THAT HAD EXISTED between English gunmakers and their counterparts in Europe had largely disappeared by the start of the 18th century. The flintlock now predominated, except in southern Europe, where the more primitive miquet lock was still widely used. While we see a more austere style, the remaining ornamentation became more sophisticated, with minimal ornate inlaying and emphasis placed on the natural qualities of the wood.



FLINTLOCK SPORT GUN

This full-stocked sport gun, attributed to John Shaw, shows considerable similarity to a military firearm of the same period. However, the attention that has been paid to the selection of the wood for its stock immediately sets it apart, as does the care that has been lavished on its finishing.

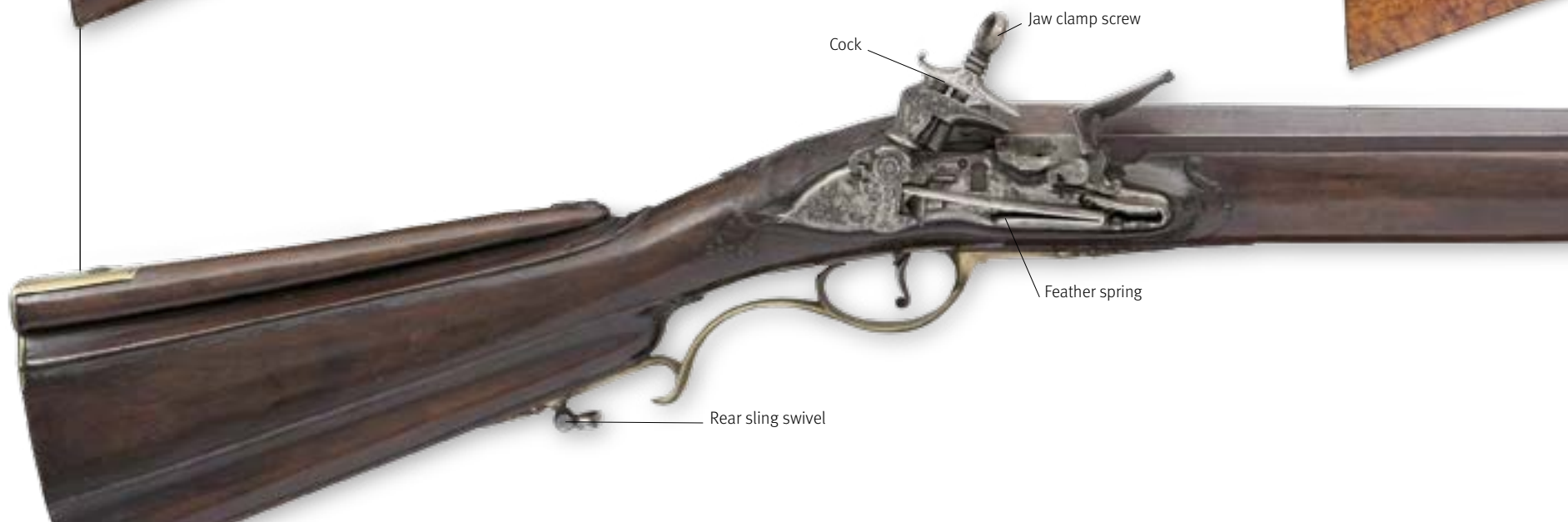
DATE	1700
ORIGIN	ENGLAND
WEIGHT	10½ LB (4.8 KG)
BARREL	55 IN (139.5 CM)
CALIBER	.75 IN



RUSSIAN FLINTLOCK

This beautifully decorated smooth-bore flintlock gun was made by Ivan Permjakov, one of the most accomplished Russian gunmakers. Although it was clearly intended as a sport gun, rather than a military weapon, it is believed to have been recovered from the field after the battle of the Alma River, which took place in 1854, during the Crimean War.

DATE	1770
ORIGIN	RUSSIA
WEIGHT	5 LB (2.2 KG)
BARREL	35 IN (89.8 CM)
CALIBER	.35 IN





Cock
Striking steel
Lock plate

Ornate pierced brass barrel band

ENGLISH FLINTLOCK SPORT GUN

The gunmaker Benjamin Griffin worked in fashionable Bond Street in London from 1735 to 1770, and was joined in 1750 by his son Joseph. Both father and son were renowned for their excellent pistols and long guns, many of which were graced with ornate engraving to the metal parts, decorative brasswork, and silver-wire inlay.

DATE	1760
ORIGIN	ENGLAND
WEIGHT	6¼ LB (2.84 KG)
BARREL	36 IN (91.4 CM)
CALIBER	.68 IN



Ramrod thimble

Ramrod



Jaw clamp screw
Gold-plated pan
Lock cover
Trigger for firing the left barrel
Trigger for firing the right barrel
Abbreviated forestock

DOUBLE-BARRELED FLINTLOCK SHOTGUN

This side-by-side double-barreled flintlock shotgun, attributed to Hadley, is typical of high-class fowling pieces of the latter part of the 18th century. Not only is its short stock silver mounted, but both its pans and its touch-holes are gold-plated to fend off corrosion.

DATE	c.1770
ORIGIN	ENGLAND
WEIGHT	5½ LB (2.55 KG)
BARREL	35½ IN (90.2 CM)
CALIBER	.6 IN



Fore sight



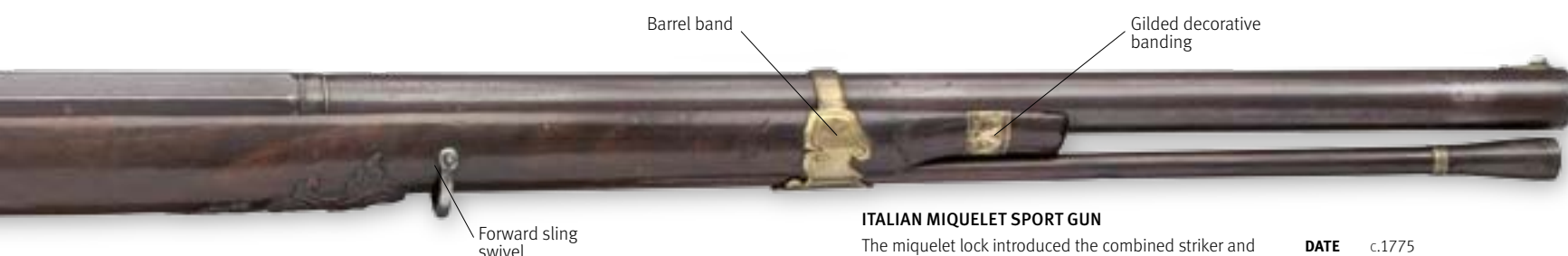
Figured walnut stock
Right trigger
Left trigger
Abbreviated forestock

Ramrod retaining thimble

SCOTTISH DOUBLE-BARRELED FLINTLOCK

By the beginning of the 19th century, the design of sport guns had already begun to diverge from that of military weapons, with shortened stocks becoming commonplace. This double-barreled piece is thought to have been made by Morris of Perth for Sir David Montcrieffe, a celebrated sportsman.

DATE	1819
ORIGIN	SCOTLAND
WEIGHT	7½ LB (3.4 KG)
BARREL	30 IN (76 CM)
CALIBER	.68 IN



Barrel band
Gilded decorative banding
Forward sling swivel

ITALIAN MIQUELET SPORT GUN

The miquelet lock introduced the combined striker and pan cover, but used an external mainspring (unlike the later true flintlock, in which the mainspring was internal). This miquelet lock musket is something of an oddity. It was manufactured in Naples by Pacifico around 1775, but has what is clearly an English-made barrel dating from around the time of the Battle of Waterloo (1815).

DATE	c.1775
ORIGIN	ITALY
WEIGHT	8¼ LB (3.75 KG)
BARREL	31½ IN (80 CM)
CALIBER	.75 IN

ASIAN MATCHLOCKS

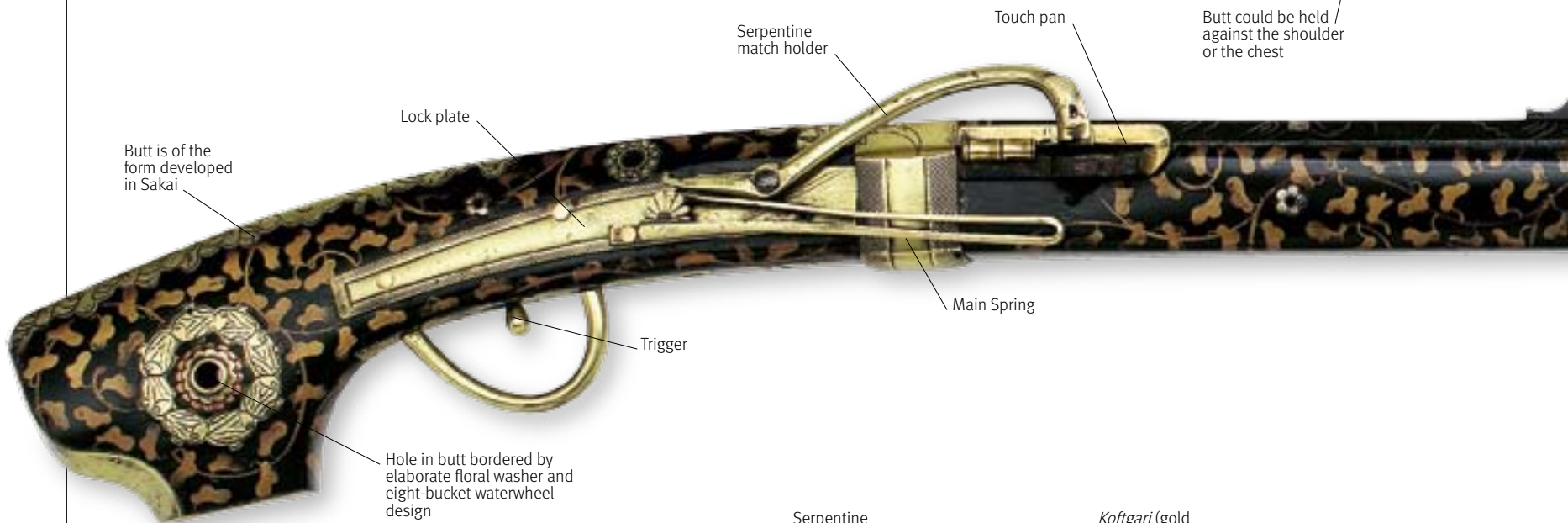
THE PORTUGUESE WERE THE FIRST EUROPEANS to reach the Indian subcontinent, in 1498, and 45 years later they arrived in Japan. They brought with them firearms in the shape of the matchlock musket. Accomplished armorers abounded in Asia, and indigenous craftsmen soon began to copy the weapons they saw, adapting them to their own needs. They also brought to firearms the same degree and style of decoration that they routinely applied to other weapons. This involved using precious metals and other valuable materials and, in the case of the Japanese, lacquerwork. Distinctive local styles soon evolved.



SRI LANKAN MATCHLOCK

This massively stocked musket was made on the island of Sri Lanka, probably toward the end of the 17th century. Its surface is ornately carved. Had it not been so ornately decorated, it would probably have been discarded when the lock broke. Its lock is missing but was usually mounted on the left-hand side of the stock.

DATE	c.1690
ORIGIN	SRI LANKA
WEIGHT	9 LB (4 KG)
BARREL	UNKNOWN
CALIBER	70 CM





INDIAN CARNATIC TORADAR

The barrel of this matchlock from Mysore (in what is now Karnataka State, southern India) is exquisitely decorated with incised flowers and foliage, and entirely gilded. The incised side plates are made of iron, and on its trigger it has a tiger in *koftgari*—a method of inlaying gold into steel or iron.

DATE	18TH CENTURY
ORIGIN	SOUTHERN INDIA
WEIGHT	9 LB (4.05 KG)
BARREL	44½ IN (113 CM)
CALIBER	16 MM



JAPANESE MATCHLOCK

A rather less ornate weapon than that shown below, this matchlock is by Kunitomo Tobei Shigeyasu of Omo, on Japan's west coast. Its red-oak stock is in the style of the Sakai school. Decoration is limited to engraving on the octagonal barrel and some brass inlay; the lock and mainspring are also of brass.

DATE	EARLY 18TH CENTURY
ORIGIN	WESTERN JAPAN
WEIGHT	9¼ LB (4.14 KG)
BARREL	40½ IN (103 CM)
CALIBER	13.3 MM



JAPANESE TEPPPO

This early 18th-century matchlock *teppo* is the work of the Enami family of Sakai, who are widely held to be among the finest Japanese gunmakers of the pre-industrial period. The stock is of red oak, decorated all over with *kara kusa* scrolls in gold lacquer, with additional inlays of brass and silver. The decoration may have been added at a later date.

DATE	c.1700
ORIGIN	JAPAN
WEIGHT	6 LB (2.77 KG)
BARREL	39½ IN (100 CM)
CALIBER	11.4 MM



FULL VIEW



INDIAN MATCHLOCK TORADAR

This 19th-century toradar has a stock of polished red wood with circular pierced medallions on either side of the butt of iron with gilding and *koftgari* applied over red velvet. The barrel has an elaborate arabesque decoration in gold *koftgari* at the breech, and the muzzle is fashioned into the shape of a tiger's head.

DATE	19TH CENTURY
ORIGIN	CENTRAL INDIA (NARWAR)
WEIGHT	10¾ LB (4.9 KG)
BARREL	49¾ IN (126.2 CM)
CALIBER	14 MM

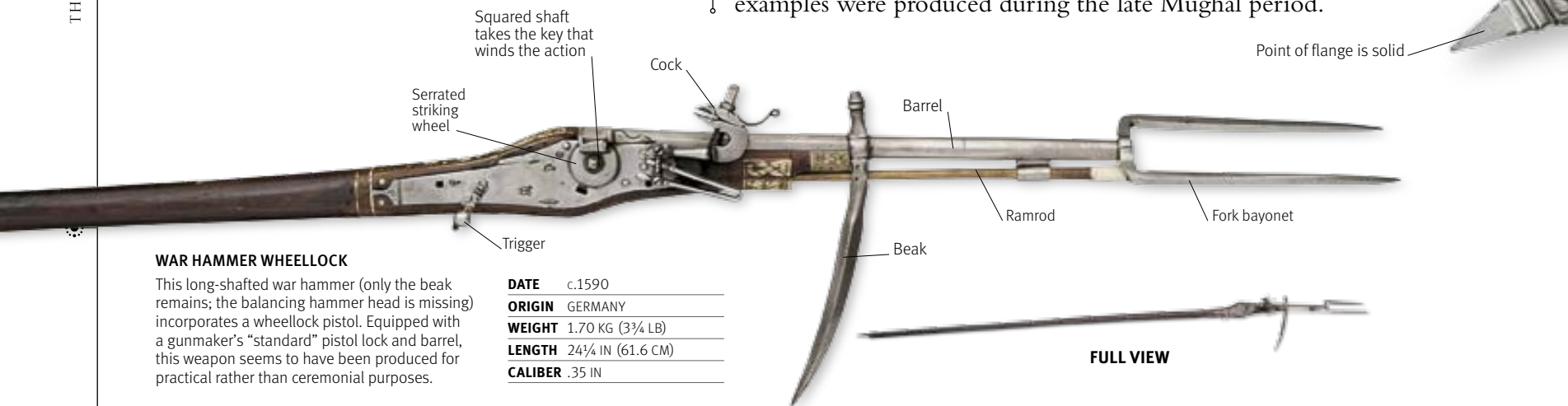


FULL VIEW

Tiger's-head muzzle

COMBINATION WEAPONS

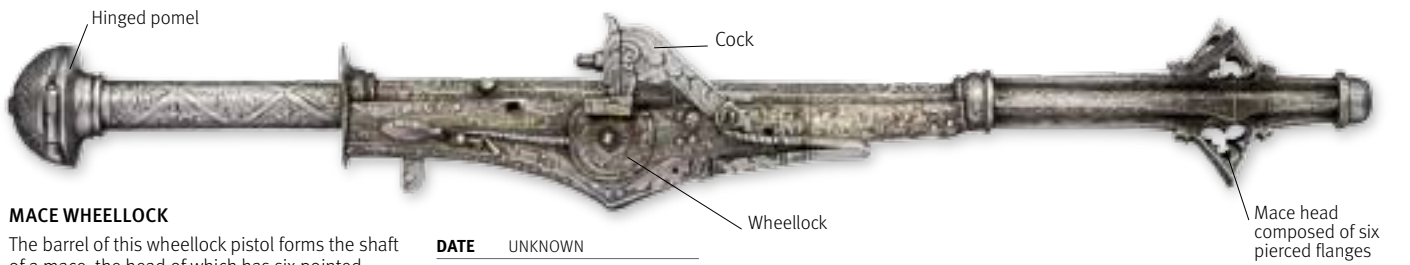
GERMAN AND ITALIAN ARMORERS of the 16th century were particularly adept at incorporating firearms into other blunt and edged weapons. Many of the examples that survive were probably intended to be showpieces, since they frequently display the most ornate decoration, and it is not clear whether they were ever meant for martial use. The tradition continued—a rifle or pistol equipped with a bayonet can be said to be a combination weapon—and spread to other countries, notably to India, where more practical examples were produced during the late Mughal period.



WAR HAMMER WHEELLOCK

This long-shafted war hammer (only the beak remains; the balancing hammer head is missing) incorporates a wheellock pistol. Equipped with a gunmaker's "standard" pistol lock and barrel, this weapon seems to have been produced for practical rather than ceremonial purposes.

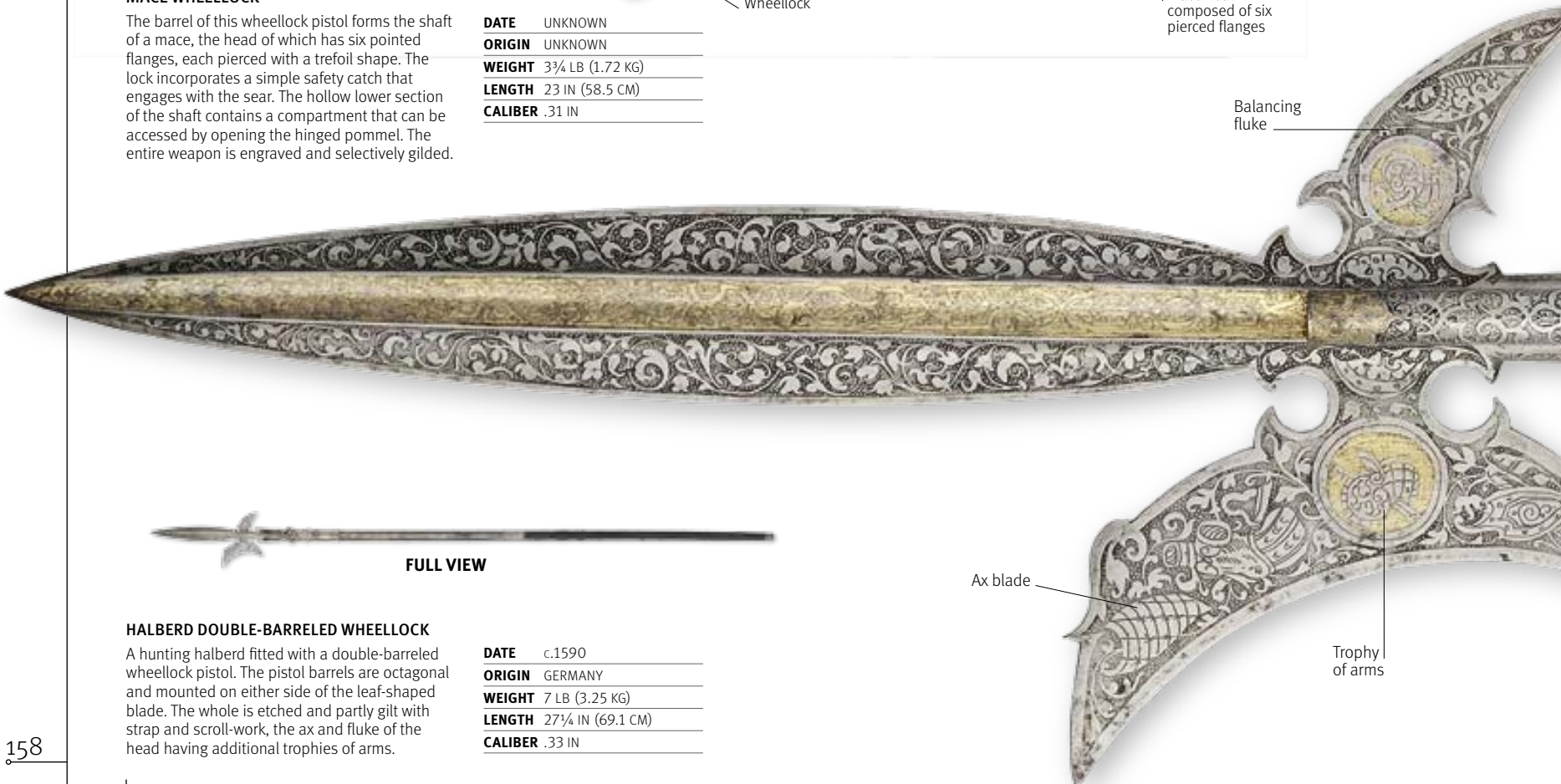
DATE	c.1590
ORIGIN	GERMANY
WEIGHT	1.70 KG (3¾ LB)
LENGTH	24¼ IN (61.6 CM)
CALIBER	.35 IN



MACE WHEELLOCK

The barrel of this wheellock pistol forms the shaft of a mace, the head of which has six pointed flanges, each pierced with a trefoil shape. The lock incorporates a simple safety catch that engages with the sear. The hollow lower section of the shaft contains a compartment that can be accessed by opening the hinged pommel. The entire weapon is engraved and selectively gilded.

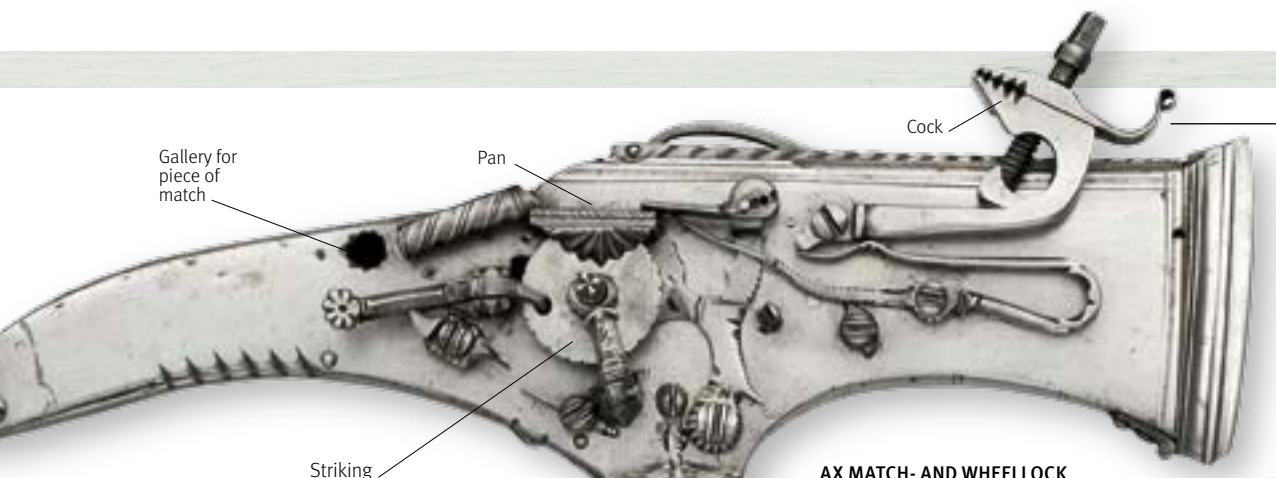
DATE	UNKNOWN
ORIGIN	UNKNOWN
WEIGHT	3¾ LB (1.72 KG)
LENGTH	23 IN (58.5 CM)
CALIBER	.31 IN



HALBERD DOUBLE-BARRELED WHEELLOCK

A hunting halberd fitted with a double-barreled wheellock pistol. The pistol barrels are octagonal and mounted on either side of the leaf-shaped blade. The whole is etched and partly gilt with strap and scroll-work, the ax and fluke of the head having additional trophies of arms.

DATE	c.1590
ORIGIN	GERMANY
WEIGHT	7 LB (3.25 KG)
LENGTH	27¼ IN (69.1 CM)
CALIBER	.33 IN



Gallery for piece of match

Pan

Cock

Striking wheel

See detail (left)

AX MATCH- AND WHEELLOCK

The hollow axhead contains five short barrels. These are hidden by a hinged cover that forms the blade. If the piece was intended to function as a weapon, which is debatable, the pointed fluke would probably have been more effective in an offensive role. The decoration is rather crude.

DATE	c.1610
ORIGIN	GERMANY OR IBERIA
WEIGHT	6½ LB (2.95 KG)
LENGTH	22 IN (56 CM)
CALIBER	.31 IN



BARREL DETAIL

The uppermost barrel is fitted with a matchlock on the left side, and the second with a wheellock. A tubular extension to the pan held a length of match. This would have been ignited by the flash of the priming, and then used to touch off the remaining three barrels, along with a sixth, located in the hollow shaft.

Hammer

One of two cocks

See detail (right)

Safety catch

Hollow shaft contains a sixth barrel



DETAIL OF HAMMER

In keeping with the highly decorated nature of the entire wheellock halberd, the paired cocks are more than just spring-loaded clamps to hold pieces of iron pyrites against the serrated edge of the striking wheels. They are exquisitely worked ornaments in their own right—gilded and chased with a floral pattern.



Axehead serves as a stabbing bayonet

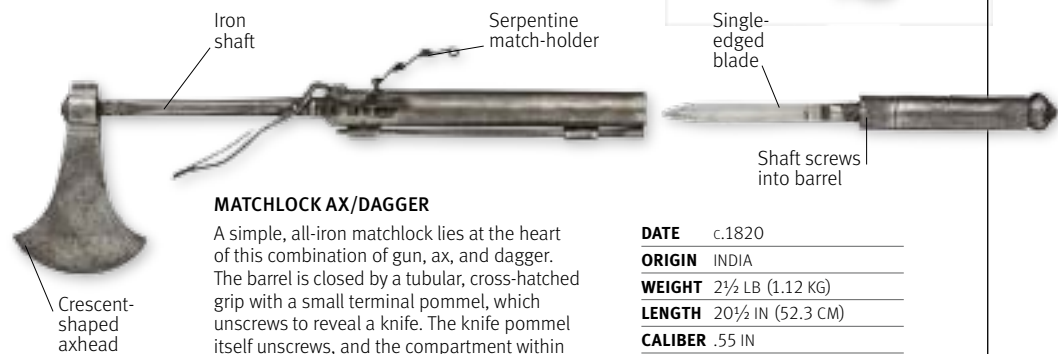
Balancing fluke

Dog lock

CARBINE AX

The butt of this fully stocked, dog-lock carbine is reduced so that it can be gripped in the hand. The axhead is shaped to double-up as a rudimentary bayonet, and its balancing fluke as the beak of a war hammer. The head, retained by a spring catch, can be easily removed.

DATE	c.1720
ORIGIN	DENMARK
WEIGHT	3½ LB (1.55 KG)
LENGTH	32½ IN (82.5 CM)
CALIBER	.58 IN



MATCHLOCK AX/DAGGER

A simple, all-iron matchlock lies at the heart of this combination of gun, ax, and dagger. The barrel is closed by a tubular, cross-hatched grip with a small terminal pommel, which unscrews to reveal a knife. The knife pommel itself unscrews, and the compartment within contains a pair of tweezers. The axhead, decorated with engraved scroll-work, is mounted on an iron shaft.

DATE	c.1820
ORIGIN	INDIA
WEIGHT	2½ LB (1.12 KG)
LENGTH	20½ IN (52.3 CM)
CALIBER	.55 IN

EUROPEAN PISTOLS 1500–1700

PRIOR TO THE INTRODUCTION of the wheellock—the first mechanical means of igniting a gun’s powder charge—pistols were rare, since one could not pocket or holster a matchlock. The invention of the wheellock (perhaps by Leonardo da Vinci) late in the 15th century made it possible to carry a gun and still have one’s hands free. Wheellocks were expensive, complicated, and prone to breakage—and usually only repairable by the man who had made the gun. By about 1650, they had been replaced by the less complex snaphaunce (which struck sparks with a spring-loaded flint).

This then evolved into the even simpler “true” flintlock.



WHELLOCK PISTOL

In northern Europe, pistols were known as dags (the origins of the name are obscure) until the late 16th century. The ball pommel, a common feature of dags, was designed to make the pistol easier to retrieve from a pocket or bag, rather than to be used as a bludgeon.

DATE	1590
ORIGIN	GERMANY
WEIGHT	4 LB (1.77 KG)
BARREL	12 IN (30.2 CM)
CALIBER	0.5 IN

SILESIA FLINTLOCK PISTOL

This large, sophisticated holster pistol was made in the principality of Teschen (now divided between the Czech Republic and Poland), but shows considerable German influence. The nature and quality of the decoration—the inlays are of stag horn—indicate that it was made as a presentation piece.

DATE	c.1680
ORIGIN	SILESIA
WEIGHT	2½ LB (1.1 KG)
BARREL	14 IN (35.5 CM)
CALIBER	29-BORE

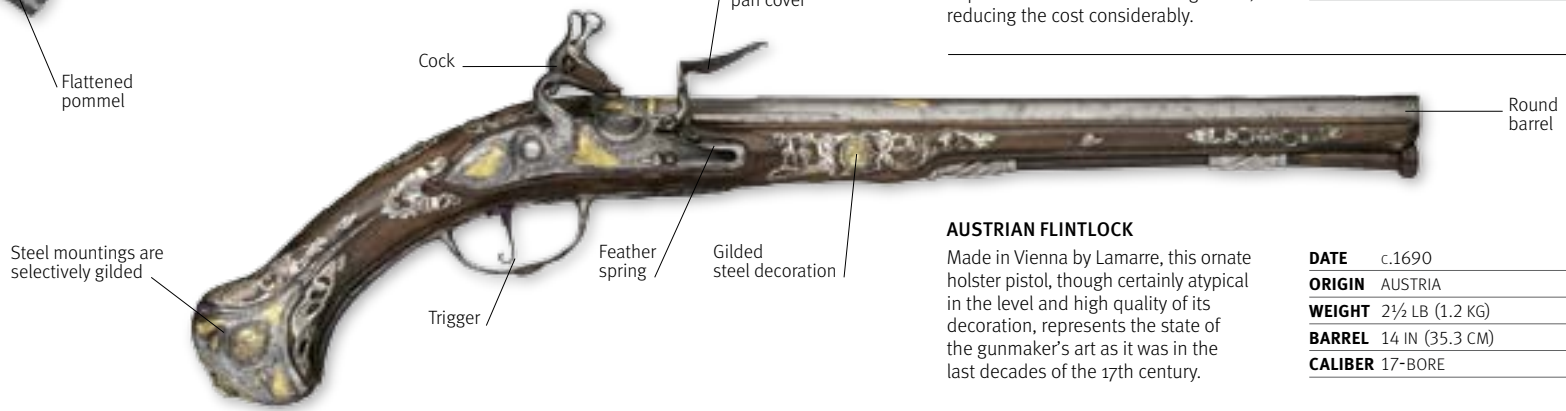
FULL VIEW



DUTCH DOUBLE-BARRELED FLINTLOCK

Early multiple-shot handguns normally had a lock for each barrel. However, by mounting a pair of barrels on an axial pin and providing each with a striker and pan with a secure cover, it was possible to present each in turn to a single lock, reducing the cost considerably.

DATE	c.1650
ORIGIN	NETHERLANDS
WEIGHT	2½ LB (1.2 KG)
BARREL	19¾ IN (50.3 CM)
CALIBER	36-BORE



AUSTRIAN FLINTLOCK

Made in Vienna by Lamarre, this ornate holster pistol, though certainly atypical in the level and high quality of its decoration, represents the state of the gunmaker's art as it was in the last decades of the 17th century.

DATE	c.1690
ORIGIN	AUSTRIA
WEIGHT	2½ LB (1.2 KG)
BARREL	14 IN (35.3 CM)
CALIBER	17-BORE



FLEMISH FLINTLOCK PISTOL

Even everyday 17th- and 18th-century firearms frequently received some embellishment in the shape of carving. Some were even given silver mountings, as can be seen here on this piece by the Flemish gunmaker Guillaume Henoul.

DATE	c.1700
ORIGIN	NETHERLANDS
WEIGHT	2¼ LB (1 KG)
BARREL	10½ IN (26 CM)
CALIBER	25-BORE



ENGLISH FLINTLOCK PISTOL

English gunmakers did not come into their own until the end of the 18th century. In the middle of the 17th century, when this holster pistol was made, they were still taking their lead from continental colleagues, and the maker of this piece, which has a French-style lock, was no exception.

DATE	c.1650
ORIGIN	ENGLAND
WEIGHT	2¼ LB (1 KG)
BARREL	14¾ IN (34.2 CM)
CALIBER	25-BORE

EUROPEAN PISTOLS

1700–1775

THE FRENCH COURT GUNMAKER Marin le Bourgeois invented the true flintlock around 1610, when he combined the striker and pan cover of the miquelet lock with the internal mechanism of the snaphaunce, and modified the sear, which “connected” cock and trigger, to act vertically instead of horizontally. While snaphaunces and miquelets were still produced for a long time after—as, for a while, were wheellocks and matchlocks—they were technically obsolete. Over the next 200 years, until the development of the percussion lock, only minor improvements were necessary, though the introduction of the enclosed box lock was a distinct step forward.



DOUBLE-BARRELED TAP-ACTION PISTOL

The tap is a rod that fits tightly into a cylinder below the pan. The tap is bored through; the bore is filled with powder, the tap is turned through 90°, and the pan is then primed in the normal way. After firing the upper barrel, the tap is turned again; the powder in the bore then primes the lower barrel.

DATE 1763

ORIGIN ENGLAND

WEIGHT 6 OZ (170 G)

BARREL 2 IN (5.08 CM)

CALIBER .22 IN



SCOTTISH PISTOL

It was the fashion in Scotland during the 18th century to make pistols entirely of brass or iron, with their entire surface covered by intricate engraving. Typically, they lacked trigger guards. Most were snaphaunces; this example is unusual, in that it is a flintlock. It was made by Thomas Cadell of Doune, who made some of the best iron pistols.

DATE c.1750

ORIGIN SCOTLAND

WEIGHT 1¼ LB (0.79 KG)

BARREL 9 IN (22.85 CM)

CALIBER .57 IN

ENGLISH PISTOL

A pistol such as this would have been carried in a holster on the saddle of a horse (gun holsters worn by people were later inventions). Holster pistols were heavy, with long barrels, and after being discharged they were often used as bludgeons—hence the metal butt cap.

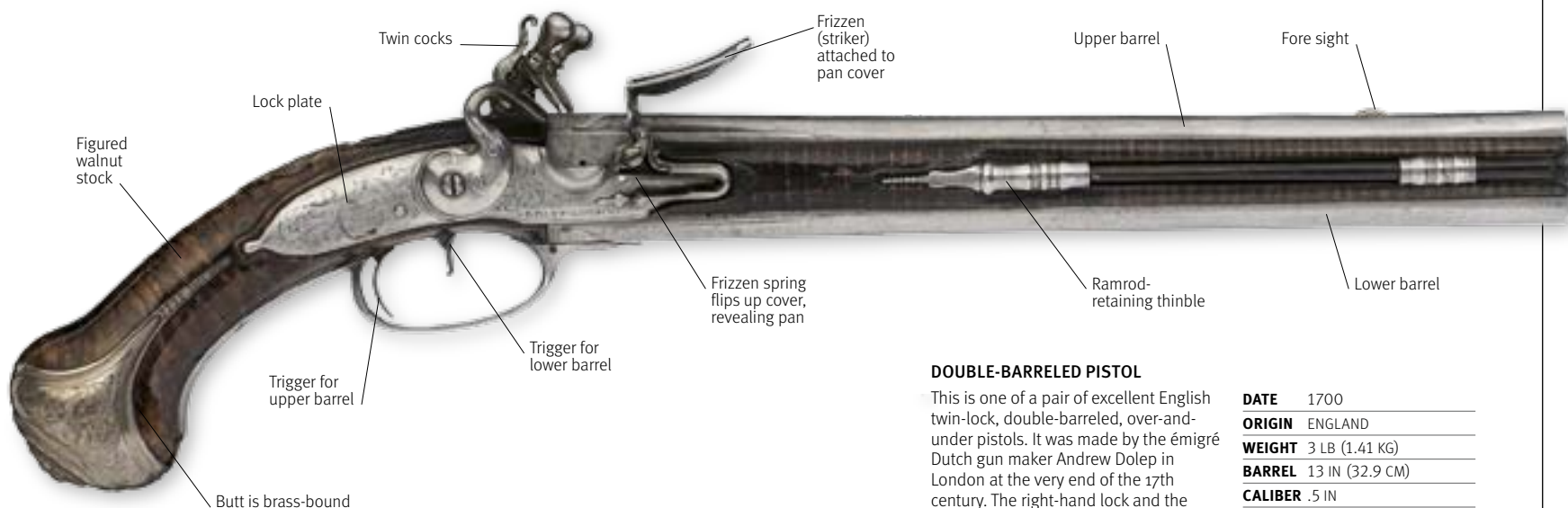
DATE c.1720

ORIGIN ENGLAND

WEIGHT 2 LB (0.88 KG)

BARREL 10 IN (25.4 CM)

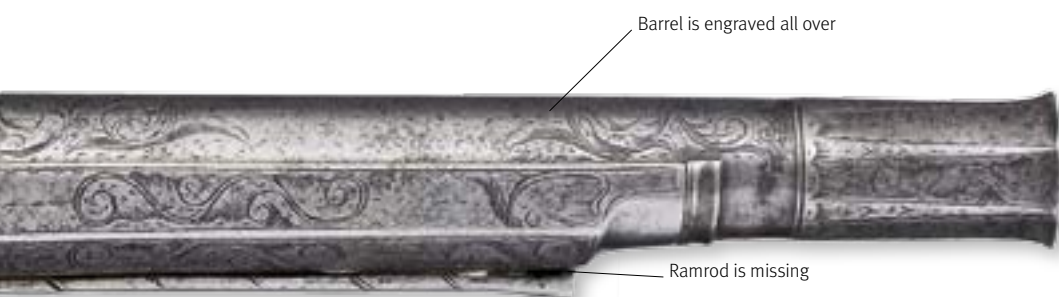
CALIBER .64 IN



DOUBLE-BARRELED PISTOL

This is one of a pair of excellent English twin-lock, double-barreled, over-and-under pistols. It was made by the émigré Dutch gun maker Andrew Dolep in London at the very end of the 17th century. The right-hand lock and the forward trigger fire the upper barrel.

DATE	1700
ORIGIN	ENGLAND
WEIGHT	3 LB (1.41 KG)
BARREL	13 IN (32.9 CM)
CALIBER	.5 IN



SPANISH BREECH-LOADING PISTOL

This miquelet-lock pistol is from Ripoll, Catalonia, a key gunmaking town in the 17th and 18th centuries. The breech-block screws out with one full turn of the trigger guard to which it is attached, allowing the ball and powder charge to be inserted.

DATE	c.1725
ORIGIN	SPAIN
WEIGHT	3½ LB (1.6 KG)
BARREL	10 IN (25.4 CM)
CALIBER	.55 IN



LIÈGE PISTOL

Made in the city of Liège by M. Delince, this holster pistol appears to have been shortened at the muzzle, and shows the signs of hard use. Oddly, for a gun made so late in the 18th century, this example has no reinforcing bridle on its lock.

DATE	1765
ORIGIN	BELGIUM
WEIGHT	2 LB (0.88 KG)
BARREL	9 IN (22.9 CM)
CALIBER	.62 IN



THIRTY YEARS WAR

In 1620, the Battle of White Mountain marked the start of the Thirty Years War, which left few regions of central and western Europe untouched. Here, the Bohemian protestants are defeated by the Christian Imperial army using pikes and muskets.



EUROPEAN TOURNAMENT ARMOR

DURING THE 15TH century, specialist armor began to be developed for tournaments, a trend that reached its highest expression in the following century. Not only was additional armor introduced for specific events—such as strengthening the vulnerable left side for jousting—but the armor became increasingly ornate, with enormous attention being paid to the most exquisite decoration. Indeed, so great was the quality of this work that some items of armor became too precious to use in combat and were used for display as parade armor. Certain types of parade armor became increasingly fantastical, with armorers mimicking current styles of civilian dress and devising “grotesque” helmets in the shape of animals.

FOOT COMBAT ARMOR

In foot combat, two contestants wearing special suits of armor fought in the lists (the arena) with poleaxes, spears, maces, swords, and daggers. Foot combat as practiced in the 15th and 16th centuries historically derived from “judicial duels”—officially sanctioned fights, often to the death, to resolve legal disputes. Foot combat was the most dangerous of all the tournament competitions, and required an armor that gave head-to-toe protection to the wearer.

DATE 1580

ORIGIN GERMANY

Ventilation holes pierced on right side, away from vulnerable left side that would face opponent's lance

Close helm with pivoted upper bevor and visor

Gorget (collar guard)

Breastplate constructed in “doublet” style

FULL VIEW

Rerebrace (upper arm guard)





Right pauldron (shoulder guard) reduced in depth to hold lance

One-piece visor pierced with multiple horizontal slits for ventilation

Detachable haut piece (upright guard)

Left pauldron

Couter (elbow guard) with detachable plates

Fauld (steel hoop) of three lames (connecting plates)

Mitten gauntlets

Long tasset (steel plate) of six lames

Greaves (plate guards for lower leg)

A KING'S ARMOR

Made for King Henry VIII of England in 1540, this harness of armor from the Italian-influenced Greenwich armories reflects the increasingly stout figure of the monarch. Intended for both field and tournament use, the decoration on this armor has been attributed to a Florentine, Giovanni de Maiano, with assistance from the painter Hans Holbein.

DATE	1540
ORIGIN	ENGLAND
WEIGHT	78 LB (35.33 KG)
HEIGHT	77¾ IN (187.5 CM)

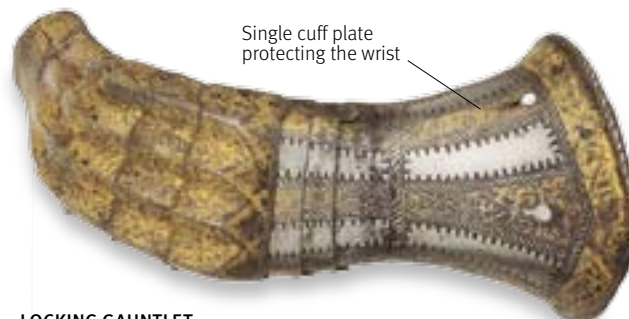


Radial decoration etched in gilt

DECORATED VAMPLATE

The vamplate was a funnel-shaped, circular guard fixed to the lance to protect the hand. The first vamplates appeared in the 14th century as a tournament feature. By the 16th century, they had evolved into large and finely decorated conical shapes.

DATE	16TH CENTURY
ORIGIN	ITALY
WEIGHT	c.1¼ LB (0.6 KG)
LENGTH	c.10 IN (25 CM)



Single cuff plate protecting the wrist

LOCKING GAUNTLET

One of the dangers faced by a heavily armored knight was his sword dropping or being knocked from his hand. A gauntlet such as this prevented it by locking the sword into the steel mitten until unlocked after combat.

DATE	16TH CENTURY
ORIGIN	ITALY
WEIGHT	c.2½ LB (1.14 KG)
LENGTH	c.6 IN (40 CM)



Leather connecting straps to backplate

Lance rest

BREASTPLATE

Made in Italy, this light yet strong breastplate is a superb example of the armorer's art; its shape imitates the bulge of the close-fitting doublet of the period. The breastplate is decorated with engraved and gilded heavenly figures.

DATE	16TH CENTURY
ORIGIN	ITALY
WEIGHT	c.6¼ LB (2.80 KG)
HEIGHT	c.19 IN (48 CM)

EUROPEAN TOURNAMENT HELMETS

THE EVOLUTION OF parade and ceremonial helmets in the 16th century very much matched that of armor intended for use on the battlefield. In the case of tilting helmets, effective protection was of very practical use to stave off potentially fatal head injuries inflicted by jousting lances. Open-faced helmets, such as the burgonet, were less suitable for this purpose and it was in close helmets of the later 16th century that parade helmets reached the height of their magnificence—the greater protective surface areas of such helms also provided more space for the armorer to add decorative engravings and ornaments.



Two sections of skull plate join at the comb

EMBOSSSED CLOSE HELMET

The entire surface of this close helmet is of bright steel embossed with scenes of equestrian combat, figures in classical armor, trophies, lions, and cherub heads in low relief. A piece of such high quality, originally gilded, was clearly designed for parade purposes. The visor has flanges to fit into the bevor, a feature typical of the close helmet.

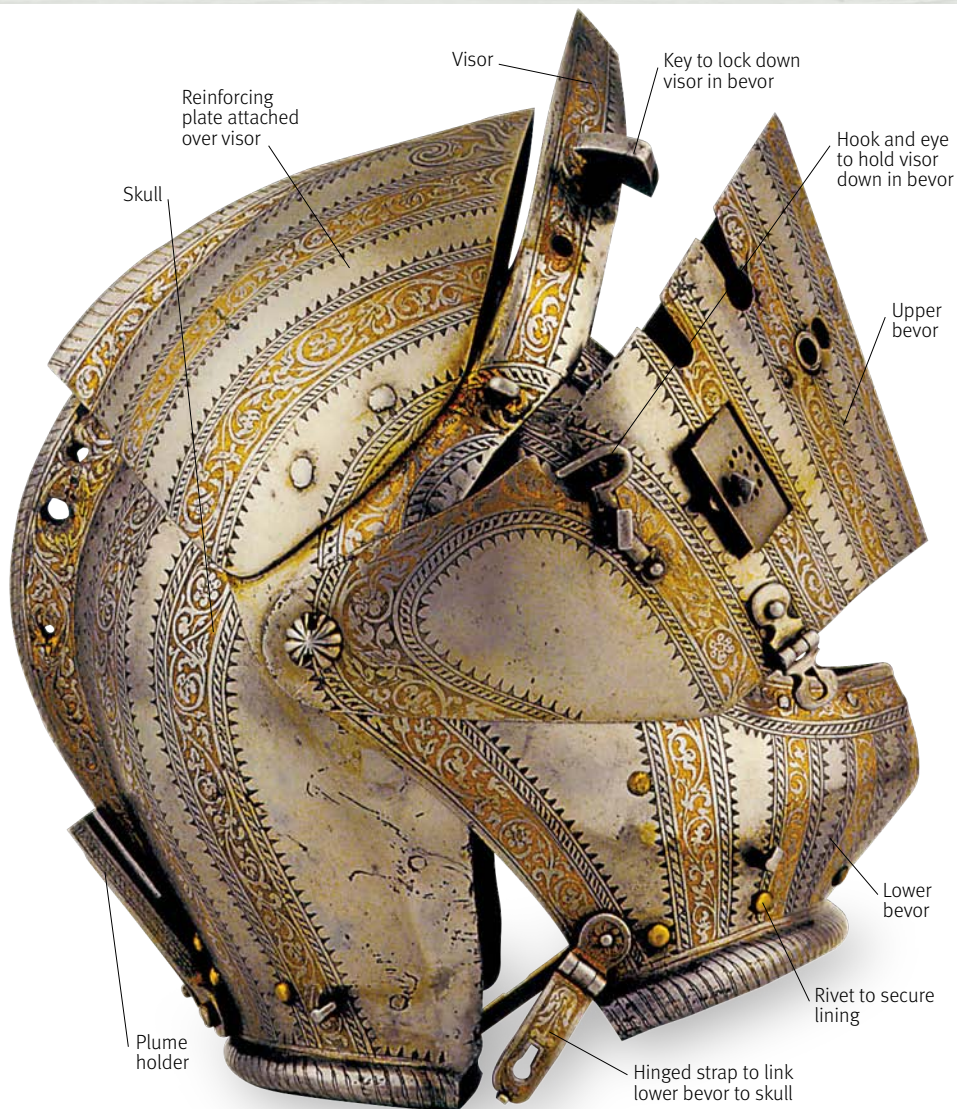
DATE c.1575

ORIGIN FRANCE

WEIGHT 5¼ LB (2.6 KG)

Sleeping lion decoration

Upper bevor with figures in Roman armor



ETCHED AND GILDED CLOSE HELMET

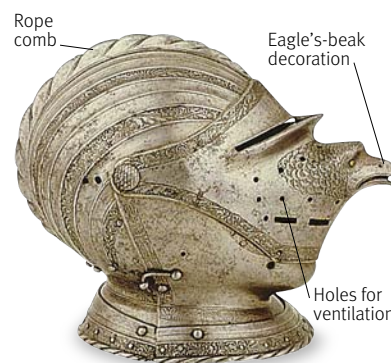
The surface of this close helmet is etched and gilded with vertical bands of flowing scrolls. Extra protection is added by a solid reinforcing plate that extends over the front of the skull. The lower edge of the helmet finishes in a hollowed roping, into which fitted the top plate of the gorget (neck armor).

DATE c.1570
ORIGIN ITALY
WEIGHT 6¼ LB (2.8 KG)



DEATH OF HENRI II AT JOUSTING TOURNAMENT, 1559

King Henry II of France was an avid hunter and participant in jousting tournaments. However, on July 1, 1559, he was killed by the lance of Gabriel Montgomery, captain of the King's Scottish Guard. His death was due to the Achilles heel of the close helmets of the day; his opponent's lance shattered and a fragment glanced down between the king's visor and bevor, piercing his eye and penetrating his brain.



EAGLE'S-HEAD CLOSE HELMET

This close helmet is boldly shaped below the eyepiece into the form of an eagle's head. The plumage of the bird's head is represented by feathers etched into the metal. The skull has a low comb with rope decorations, on either side of which are seven rows of fluting, partly decorated with elegant bands of stylized foliage.

DATE c.1540
ORIGIN GERMANY
WEIGHT 7 LB (3 KG)



PARADE CASQUE

This ornate casque helmet forms part of a tradition of "grotesque" helmets intended for parades or masques, particularly popular in the 16th century. With its striking embossed man's face with staring eyes, and its extravagant plumelike comb, this piece may well have formed part of a whole suit of "costume" armor.

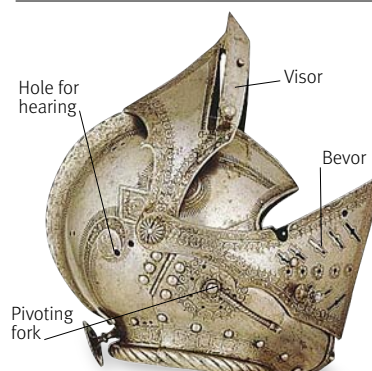
DATE c.1530
ORIGIN ITALY
WEIGHT 5 LB (2.2 KG)



OPEN-FACE BURGONET

The burgonet has a characteristic low and rounded skull, turned outward to just below the ears, with the cheeks left unprotected. A dolphin mask in front of the skull has its skin and fins embossed in gold. On either side of the central mask are the tails of the dolphin, attached by turning points.

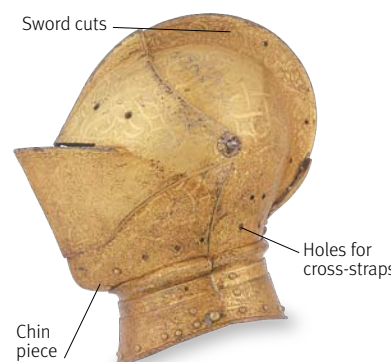
DATE c.1520
ORIGIN GERMANY
WEIGHT 5 LB (2.2 KG)



ARMET

The armet was an improved form of close helmet. It offered good protection, with large cheek pieces secured below the visor pivot, the opening at the back often protected by a round plate. The protruding stalk at the back was to connect a "wrapper"—a tall plate in front of the visor on the left side, the point at which a jousting lance might strike.

DATE c.1535
ORIGIN GERMANY
WEIGHT 5 LB (2.2 KG)



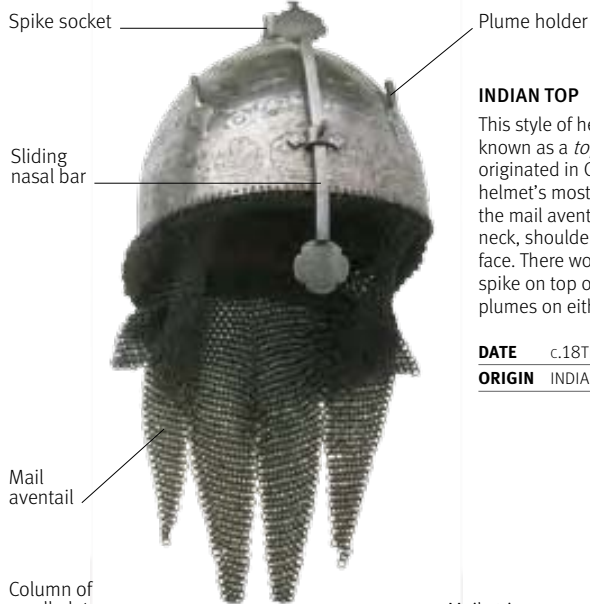
GILDED CLOSE HELMET

The whole of this tilting helmet is gilt, with decoration consisting of interlaced strapwork and scrolls deeply etched into the surface, with ornaments of foliage, winged heads, and grotesque animals. The other side of the visor is pierced by ten slots for breathing. The top of the comb is marked with sword cuts, which show that the helmet saw violent action. It formed part of a suit originally made for Emperor Ferdinand I.

DATE c.1555
ORIGIN GERMANY
WEIGHT 5 LB (2.2 KG)

ASIAN ARMOR AND HELMETS

BETWEEN THE 16TH AND 18TH CENTURIES, broadly similar weapons and armor were used by armies from the Middle East to India and Central Asia. These included mail-and-plate body armor and a type of round shield, made of leather or steel, that was called a *dhal* in India and a *sipar* in Persia. China and Korea, while culturally distinct, were also influenced by these essentially Islamic styles. Even though firearms were widely used in Asia, armor and shields remained in use for longer than in Europe.



INDIAN TOP

This style of helmet, which is known as a *top* in India, probably originated in Central Asia. The helmet's most striking feature is the mail aventail that guards the neck, shoulders, and part of the face. There would have been a spike on top of the helmet and plumes on either side of the skull.

DATE c.18TH CENTURY

ORIGIN INDIA



INDIAN MAIL-AND-PLATE COAT

This style of mail-and-plate armor, with four large plates at the front, two smaller ones at the sides, and further plates at the back, was favored by Mughal emperors, including Aurangzeb (reigned 1658–1707). It did not offer absolute protection: missiles and stabbing weapons could potentially penetrate the areas of riveted mail.

DATE EARLY 17TH CENTURY

ORIGIN INDIA

FULL VIEW



INDIAN MAIL-AND-PLATE JACKET

Known in India as a *zereh bagtar*, this jacket combines both plate and mail armor. Mail-and-plate combinations were in general use across the Islamic world from the Ottoman Empire to Central Asia by the 15th century, and they were the predominant armor of Mughal India. This example has columns of 60 to 65 small metal plates and a mix of welded and riveted mail.

DATE EARLY 18TH CENTURY

ORIGIN INDIA

WEIGHT 17¾ LB (8.1 KG)

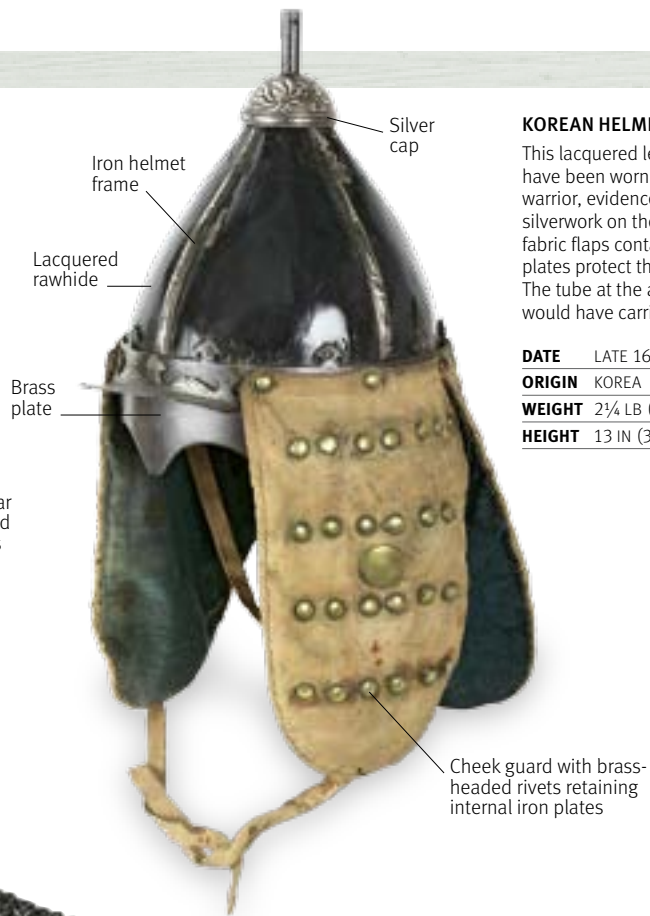
LENGTH 27¼ IN (69.5 CM)

Lining of red silk

Short mail sleeve

Large steel plates

Riveted mail covers waist



KOREAN HELMET

This lacquered leather helmet would have been worn by a wealthy Korean warrior, evidenced by the decorative silverwork on the cap and peak. Three fabric flaps containing internal iron plates protect the neck and cheeks. The tube at the apex of the helmet would have carried a plume.

DATE LATE 16TH CENTURY

ORIGIN KOREA

WEIGHT 2¼ LB (2.4 KG)

HEIGHT 13 IN (33 CM)



CHINESE ZHOU

This helmet, or *zhou*, is from Ming dynasty China. The skull of the helmet is made in two pieces joined by a riveted seam. This is a luxury item, elaborately decorated with precious stones and corals, and with a gilt holder at the apex into which a plume would have been inserted. Traces of blue silk remain at the base of the skull—probably all that is left of a neck guard.

DATE 16TH CENTURY

ORIGIN CHINA

HEIGHT 13¾ IN (35 CM)



INDIAN DHAL

This Indian round shield, or *dhal*, is made of watered steel. It was held by passing an arm through two handles on the back. The handles are fastened by ring bolts, which are riveted to the four bosses on the shield's face. Shields gave Indian craftsmen an irresistible opportunity to indulge their passion for chiseled and gilded decoration.

DATE c.1800

ORIGIN INDIA

WEIGHT 8½ LB (3.8 KG)

WIDTH 24 IN (60 CM)



FULL VIEW



SAMURAI ARMOR

JAPANESE SAMURAI ARMOR, which evolved from the Asiatic tradition of lamellar (scaled) armor, consists of lacquered plates of metal or leather bound together by leather or silk lacing. This flexible armor gave adequate protection while permitting the free and rapid movement needed by a sword-fighter. Samurai armor increased in complexity over time, achieving its pinnacle in the *tosei gusoku* (modern armor) style from the 16th century onward. Armor and helmets were intended for display as well as combat. At their most ornate in the Edo period, after the pacification of Japan, the samurai had then ceased to be active warriors.



Shikoro (neck protection)

Sode (shoulder defence)

Suneate (greaves)



Suigyū-no-wakidate (gilt-wood buffalo horn ornament)

KABUTO (HELMET)

Leather-covered fukigayeshi (sweepback)

Gold lacquered browplate

Skirts protect thighs

Cords attach mask to the head here

Yodare-kake (throat defense)



Ressei men ("Furious power") face mask

MEMPO (FACE DEFENSE)



SODE (SHOULDER DEFENSE)

KOTE (ARM DEFENSE)



Tekko (hand defense)

Tying bands

SUNEATE (GREAVES)



TOSEI GUSOKU (MODERN ARMOR)

This fine quality *tosei gusoku* armor is twinned with a helmet spectacularly topped by imitation buffalo-horn *wakidate*, or side crests (antlers were also popular as *wakidate*). The black lacquered half-mask, or *mempo*, has wrinkles and teeth but lacks one frequently found feature: a moustache. The mask protected the lower face, helped hold the helmet on the warrior's head, and made the wearer look more frightening. Other details, such as the eyebrows embossed on the browplate, also helped to create an intimidating effect. An aesthetically pleasing color scheme is achieved through the use of gold lacquer and red silk.

DATE 19TH CENTURY

ORIGIN JAPAN

WEIGHT HELMET 6 LB (2.75 KG)



**FRONT OF DO
(CUIRASS)**

**REAR OF DO
(CUIRASS)**

SHOULDER DEFENSE (SODE)

**KOTE (ARM
DEFENSE)**

**SUNEATE
(GREAVES)**

Abiki-no-o
(shoulder cord)

Gattari (bracket
for personal flag)

Tateagi
(laced plate)

Kusari
(plate in mail)

Gold
lacquered
ito (plates)
fastened
with red
silk knots

Gold
lacquered
hide

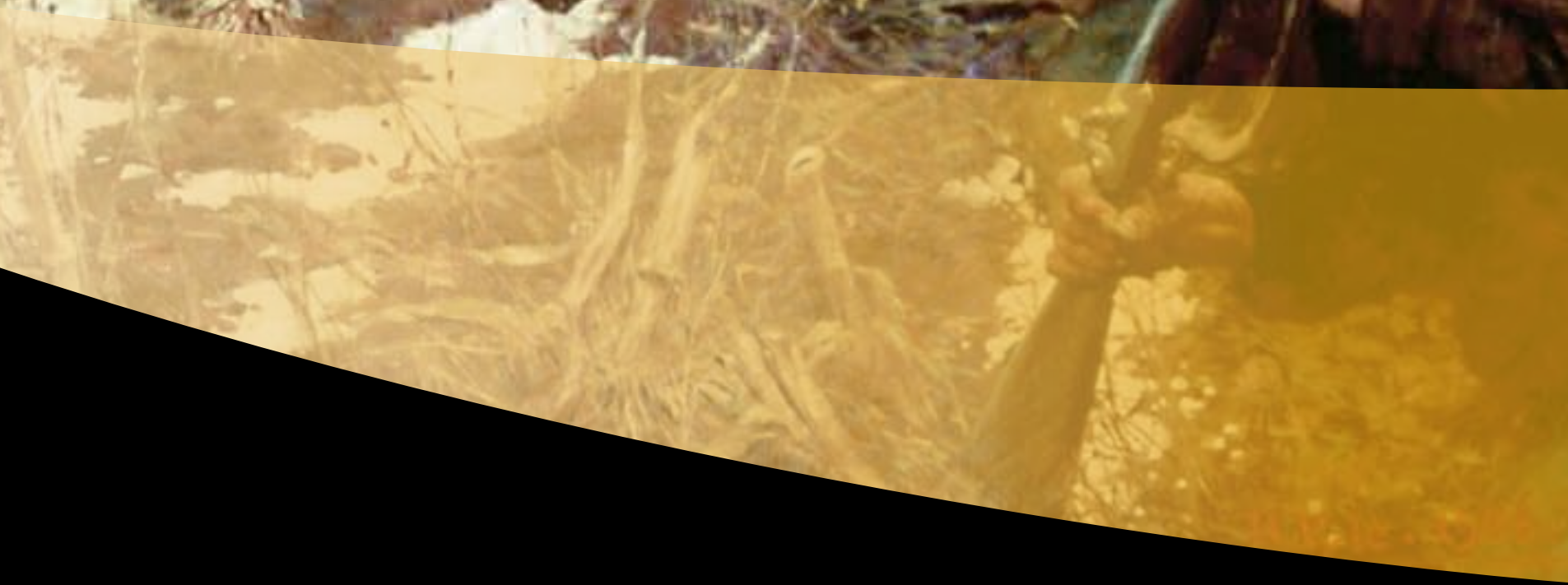
Yurugi-ito (lacing)
for *kusazuri* (skirts)





THE REVOLUTIONARY WORLD





In 1770, Europe was ruled largely by dynastic sovereigns, who continued to conduct politics and fight wars much as they had done 200 years before. Yet over the next century, revolutions—both political and industrial—transformed the face of warfare, as new technologies, ideas of nationalism and democracy, and efficient bureaucracies gave ever more power to those who possessed them and reduced to political ciphers or colonies those who did not.

IRREGULAR WARFARE

The British underestimated the ability of their enemy's colonial militias during the American Revolution (1775–83). Here, Benedict Arnold—lying wounded—directs the assault on Bemis Heights in October 1777, with swords, rifles, and bayonets, which forced the British regulars to withdraw.



1775
Battles of Concord and Lexington begin American Revolution

1790s
Henry Shrapnel invents the "shrapnel shell" packed with musket balls (adopted by British army 1803)

1792–1815
French Revolutionary and Napoleonic Wars

c.1805
William Congreve develops first effective rockets

1815
Napoleon finally defeated at Waterloo

1835
Samuel Colt patents his breech-loading revolver

1840s
Telegraph becomes widespread, allowing communication with battlefield commanders

1775

1790

1800

1830

1775
First submarine *Turtle* used in American Revolution

1781
British surrender of Yorktown signals final defeat by American forces

1796
Napoleon's successful Italian campaign

1805
British naval victory at Trafalgar; Napoleon wins Battle of Austerlitz

1830s
French campaigns in Algeria

1839
First Opium War between Britain and China

BEGINNING WITH THE American Revolution, the traditional order was challenged, overthrown, and then, reconstituted. Britain fought a bitter war from 1775 to 1783 to retain its North American colonies, which demanded some share in their governance. George Washington, the commander of the rebel army, knew that he could not match the British in open battle. But the British depended on supplies reaching them by sea, and when French intervention in the war in 1778 hurt this, their control over North America became tenuous. The Americans became a fighting army with the help of Augustus von Steuben, a Prussian army officer, who devised a simplified drill for Washington's soldiers. The result was a humiliation for Britain and the loss of most of its North American colonies.

THE FRENCH REVOLUTIONARY WARS

Revolution broke out in France in 1789, in part provoked by anger at unemployment and high levels of taxation needed to fund the army, and Louis XVI's inability to do anything to remedy these problems. Most army officers fled the country, or at least resigned their commissions. By that time France was at war with Austria and so fewer experienced officers were available. Their replacements came from the middle and lower classes, so that by 1794, only one in 25 officers was a nobleman. A mass conscription in 1793 in effect, militarized France, as all men of military age were deemed to be in service. The new army adopted modified tactics—from 1792 skirmishers or sharpshooters were introduced into infantry battalions. These *tirailleurs* would harass enemy formations and screen the maneuvers of their parent battalions. A string of French Republican victories, most notably those of Napoleon Bonaparte in Italy from 1796, exhibited the new army's ability to use these revised combinations of line, column, and skirmishing tactics to great effect.

In the 1790s, the French army pioneered the use of the division, a self-contained unit of several regiments combining infantry, cavalry, and artillery. Napoleon took this further, establishing a system of army corps, each made up of several divisions. The corps system meant that parts of the French army, which “lived off the land” instead of relying on fixed supplies, could take separate routes to their objective, reducing the risk of exhausting the ability of the areas they marched through to support them. This flexibility and the speed of the French armies left Napoleon's enemies often seeming sluggish.

Napoleon also expanded the French artillery, and by 1805 the army had 4,500 heavy guns and 7,300 medium and light. A string of victories, most notably Marengo (1800) and Austerlitz (1805), left the successive coalitions formed against him reeling. Napoleon also realized the destruction of the enemy's field armies should be his main objective, rather than allowing himself to be delayed by protracted sieges.

Yet the strain on France's resources began to show. An estimated 20 percent of Frenchmen born between 1790 and 1795 died in the wars. Increasingly, Napoleon's soldiers were foreign, less well-trained and less motivated than the French. After 1808, divisions were standardized to two brigades, and the numbers of companies per battalion reduced to make command easier. The result was a less flexible force, and Napoleon's later battles tended to be elephantine affairs, with large masses of men hurled headlong against the enemy, and far fewer flashes of sheer brilliance. At Borodino, in the Russian

campaign of 1812, some 250,000 men fought on a narrow front just 5 miles (8 km) wide, leading to heavy losses on both sides.

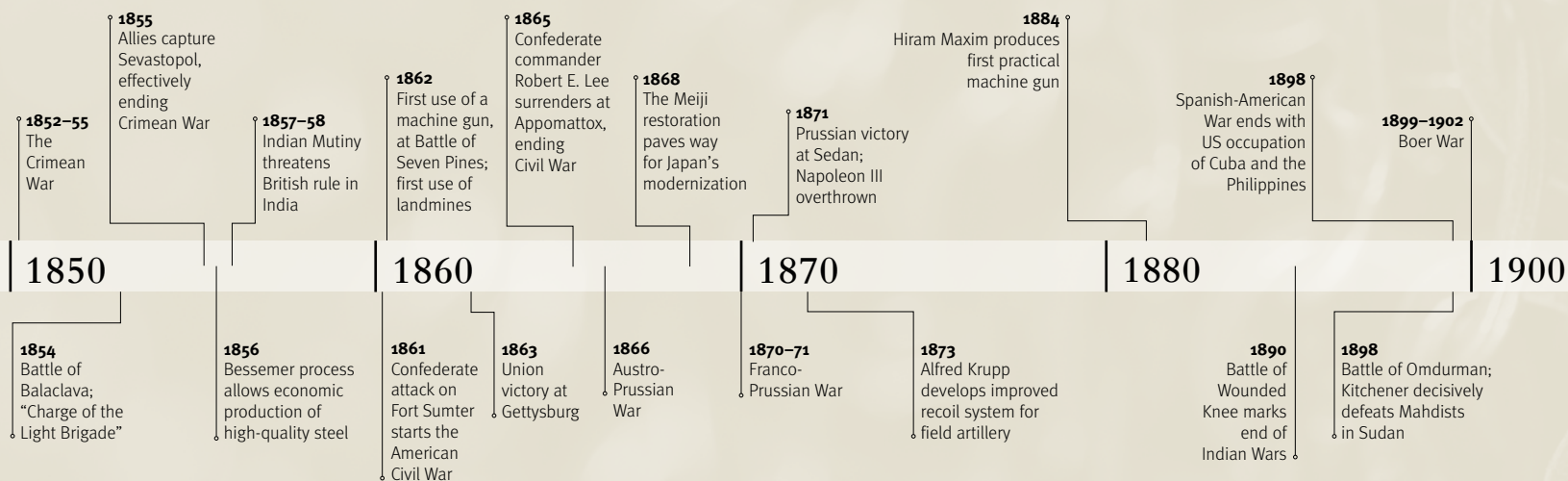
ENGLISH TACTICS AGAINST NAPOLEON

During this period Napoleon's enemies, too, had learned and adapted their armies. The British experimented with light infantry from the 1790s, and in 1800 an experimental corps was set up armed with new rifled muskets, more accurate than the prevailing smooth-bores. The British favored line over column tactics and also paid more attention to logistics, not relying so consistently on foraging, which, in the guerrilla-infested hills of Spain, had badly failed the French forces. In 1813 the Prussians created regiments of Jäger, volunteer riflemen, as a riposte to the French *tirailleurs*. Attrition, the exhaustion of French resources, British naval superiority—most notably demonstrated at Trafalgar (1805)—and Napoleon's strategic greed led to his downfall in 1814, and his return from exile for the “Hundred Days” ended similarly in defeat at Waterloo in 1815.



BATTLE OF THE NATIONS

French cuirassiers charge at the Battle of Leipzig in 1813. The sheer size of the force opposing him—at 365,000 men—was too much even for Napoleon. The situation was made worse by the fact that his army sorely missed the veterans who had perished in Russia the year before.





TRENCH WARFARE

The final stages of the American Civil War degenerated into a dogged campaign of entrenchment and siege. Here, Union soldiers wait in the trenches in front of the Confederate stronghold of Petersburg, Virginia.

TECHNICAL ADVANCES

The Congress of Vienna (1815) ensured no repetition of the revolutionary wars for several decades, and Europe relapsed into a sort of strategic slumber. Napoleonic drill and tactics were largely retained, but there were important technical advances, including the invention of the cylindro-conic bullet, which expanded on firing, gripping the rifling of the barrel more tightly, and doubled the effective range of firearms to around 440–650 yards (400–600 m). Adapted by Claude-Étienne Minié in 1849, the new rifles became the mainstays of European armies. The increasing firepower of troops, and the capacity of technologically advanced powers to produce large quantities of weapons that could be used even by raw conscripts, led to an increasing industrialization of warfare, in which it was the output of factories, the laying down of railroads, and strategic planning, rather than élan or tactical brilliance that delivered

victories. The new technology saw its first real test in the Crimean War (1853–55), in which Britain and France invaded Russia to prevent the tsar from picking bare the bones of the decrepit Ottoman empire. At Inkerman in 1854, British Enfield rifled muskets slaughtered the Russians, who suffered 12,000 casualties to the allies' 3,000. Yet the British neglected logistics this time—their supply base at Balaclava turned out to have a quayside of only 33 yards (30 m), and it was a 9-mile (15-km) journey to the front line. The campaign became bogged down in a bludgeoning siege of the fortress-city of Sevastopol, whose defensive trench networks presaged those of World War I.

THE AMERICAN CIVIL WAR

The American Civil War (1861–66) saw the full flowering of industrialized warfare. It was the North, which had over 70 percent of the undivided pre-war Union's population and almost all its industry—93 percent of pig-iron and 97 percent of firearms production—that possessed critical advantages from the outset. The South had brilliant generals, such as Robert E. Lee, and an army motivated by the desire to defend its way of life. Yet victories such as Bull Run (1861), and Fredericksburg (1862), and a near-run thing at Gettysburg (1863), amounted in the end to nothing. The Union commander Ulysses S. Grant realized that by cutting the Confederacy in two and destroying its fledgling industries and railroad system, its capacity to resist—no matter battlefield heroics—would be strangled. American Civil War soldiers could fire at a rate of five to six rounds per minute and extended lines proved more effective than the massed columns of Napoleonic warfare. Temporary earthwork entrenchments such as breastworks and rifle pits became more important, while the withering fire of Springfield rifled muskets meant that where infantry advanced unsupported in the open, as in “Pickett's Charge” at Gettysburg, they were simply mown down.

THE PRUSSIAN ARMY

In Europe, meanwhile, Prussia, under von Moltke—Chief of General Staff from 1858—implemented a system of uniform education for all staff officers, and service in the army was extended to five years, so that by the late 1850s, the army had 504,000 troops (including reserves). The Prussians also invested heavily in railroads, laying down nearly 19,000 miles (30,000 km) by 1860. Their soldiers, moreover, were equipped with the Dreyse needle gun, a breech-loader which could be shot from a prone position, and which fired up to five times faster than muzzle-loaders. Although it was prone to misfire, the Dreyse gave the Prussians the edge on the battlefield and this, along with their superior planning, enabled them to win a crushing victory over the Austrians at Königgrätz in 1866, which freed Bismarck, the German Chancellor, to pursue his goal of a united German state.

The attempts by French emperor Napoleon III to interfere with Bismarck's ambitions led to the Franco-Prussian War (1870–71). The French were armed with the Chassepot rifle, a more reliable version of the Dreyse. The Prussians exploited their superior staff numbers to the full, and were able to deliver 380,000 men—in large part by train—rapidly to the frontier. They also possessed steel breech-loading cannons designed by Alfred Krupp, which had a range of up to 7,600 yards (7,000 m) and could devastate French formations as they formed up far from the battlefield. The French were outmaneuvered at a strategic level, and when their last operational field army was surrounded at Sedan (1871), its surrender spelled the end of Napoleon III's rule and any effective opposition to Bismarck's plans for Germany.

THE GROWTH OF EUROPEAN IMPERIALISM

Once Bismarck had forged a united country after 1871, he turned to acquiring an overseas empire, beginning with modern Namibia, Togo, and Tanzania in the 1880s. The late



1866 WINCHESTER

The 1866 model Winchester was known as the “Improved Henry” and could fire 30 rounds a minute, double that of its predecessors. It remained in production right up until 1898, at the time of the Spanish-American War.

19th century was the high-point of European imperialism, which developed a momentum of its own far beyond the need to protect trading posts or suppress native opposition. Many of the wars fought in the last half of the century were imperial, in which Western technological superiority and organization normally proved decisive. At Omdurman in the Sudan in 1898, Kitchener, the British commander, simply deployed his 25,000 men in tight formation, and when the opposing Mahdists charged, they were scythed down by his Maxim machine guns: the Sudanese lost up to 30,000 men for the loss of only 50 of the Anglo-Egyptian force.

Non-European armies did, occasionally, emerge victorious. In 1896 the Italians were defeated at Adowa by an Ethiopian army armed with 100,000 rifles that the French governor of Somaliland had obligingly sold to them. Where native armies adopted guerrilla warfare, such as Samori Touré in West Africa in the 1880s and 1890s, European tactics struggled to overcome them. Eventually, however, even stubborn resistance was not enough. The Europeans or Americans had superior industrial and demographic resources, and could weather defeats their opponents could not.

Germany's victories in 1866 and 1870 led German statesmen and generals to believe that rapid deployment and the exploitation of technology should override all other concerns. At the end of the 19th century, European countries became embroiled in an arms race that was ruinously expensive and contributed to a chilling climate of mistrust in international diplomacy. The rapid growth of the German economy, unaccompanied by a corresponding increase in political sophistication, led to a dangerous alliance of economic power, nationalist agitation, and technological prowess, which, when a spark set it alight, would lead to the appalling carnage of World War I.

NATIONALISM

The French Revolution unleashed a political virus in Europe, with the notion that states should constitute the whole of a people or "nation." Hence, France was the nation of the French and should include all of them. Multiethnic empires, such as those of the Austrian Habsburgs or the Ottoman Turks, were threatened with extinction as this idea found political and military expression. In 1848, a wave of nationalist revolts burst across Europe, sweeping a revolutionary government to power in Hungary and threatening to overturn the Prussian and French regimes. In 1861 nationalism contributed

to the unification of Italy—with Garibaldi (pictured here) playing a flamboyant role, and Germany in 1867. Similarly, nationalist feelings contributed to the decay of the Ottoman Empire, from the Greek declaration of independence in 1821. All these movements appealed to a national ideal, inspiring a fervor that loyalty to a dynasty, or remote imperial power, had almost never been able to do.

INSURRECTION IN 1861 AT PALERMO WHICH LED TO THE UNIFICATION OF ITALY



BOER PICKET

It cost the British two years, the despatch of 450,000 men, and 22,000 dead to win the Boer War (1899–1902). The Boers, armed with lethally effective Mausers, won a series of victories such as Spion Kop (1900). Even when their field armies were finally defeated, it took unconventional British tactics such as the use of concentration camps to force the last groups of guerrillas to surrender.



EUROPEAN SWORDS

BY THE TIME of the French Revolutionary (1789–1799) and Napoleonic Wars (1799–1815), cavalry edged weapons had evolved into the long, straight, thrusting sword of the heavy cavalry, and the light cavalry's curved saber that was designed for cutting and slicing. For the infantry, swords were already well on their way to becoming ceremonial weapons, but such was their status that they continued to be used as symbols of rank, carried by officers and senior NCOs. Having lost their practical function, infantry swords became increasingly decorative, some even harking back to weapons of the classical era.



MODEL 1827 SABER

A copy of cavalry swords of the Napoleonic era, the Russian Model 1827 Cavalry Sabre had a slightly curved single-edged blade with a single wide fuller and a brass hilt. The twin langets were useful in firmly securing the sword to the scabbard, as well as acting as a trap to an opponent's sword.

DATE c.1827

ORIGIN RUSSIA

WEIGHT 2¾ LB (1.22 KG)

LENGTH 40¼ IN (102 CM)

Single-edged blade

1853 PATTERN CAVALRY SWORD

Of fairly conventional construction, this weapon—the 1853 Pattern Cavalry Sword—would have equipped British heavy cavalry regiments in the Crimean War and during some of Britain's subsequent colonial campaigns.

DATE 1853

ORIGIN UK

WEIGHT 2½ LB (1.13 KG)

LENGTH 40 IN (101.5 CM)



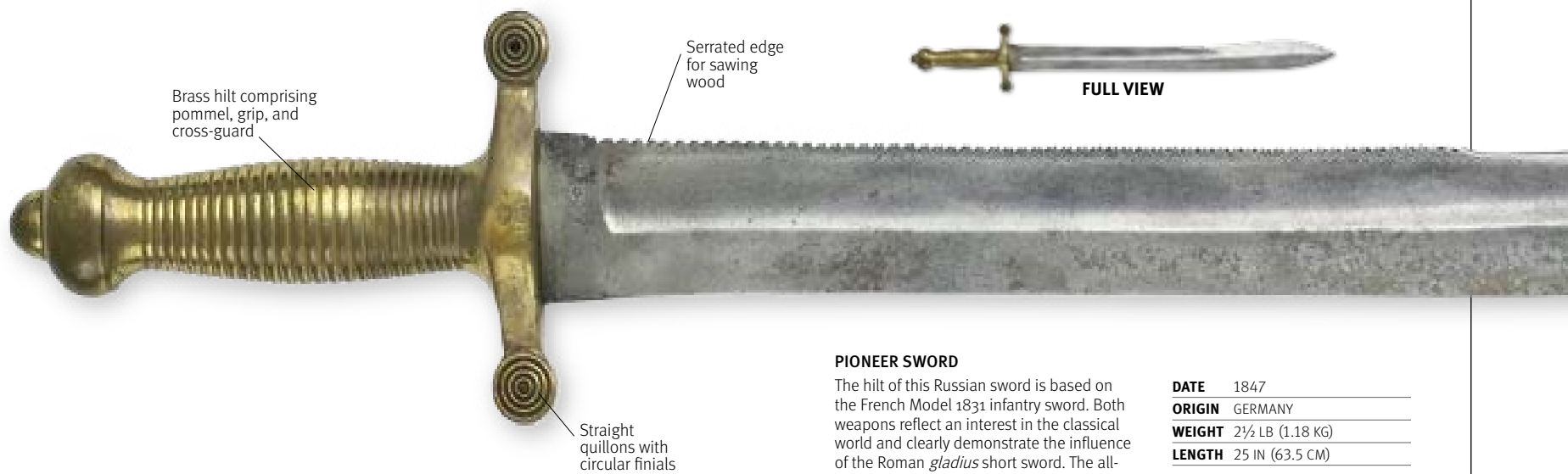
FULL VIEW

FULL VIEW

Upper quillon slightly curved toward blade

Three-bar steel hilt

Single-edged blade



Brass hilt comprising pommel, grip, and cross-guard

Serrated edge for sawing wood

Straight quillons with circular finials

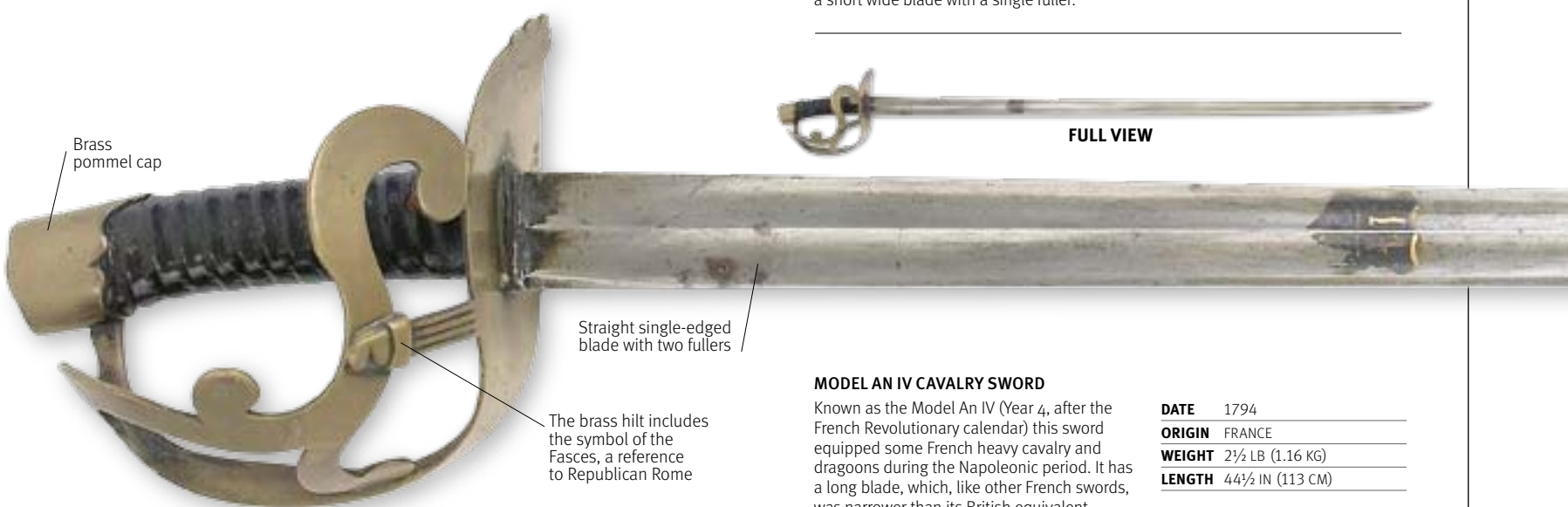


FULL VIEW

PIONEER SWORD

The hilt of this Russian sword is based on the French Model 1831 infantry sword. Both weapons reflect an interest in the classical world and clearly demonstrate the influence of the Roman *gladius* short sword. The all-brass hilt includes a simple cross-guard and a short wide blade with a single fuller.

DATE	1847
ORIGIN	GERMANY
WEIGHT	2½ LB (1.18 KG)
LENGTH	25 IN (63.5 CM)



Brass pommel cap

Straight single-edged blade with two fullers

The brass hilt includes the symbol of the Fasces, a reference to Republican Rome

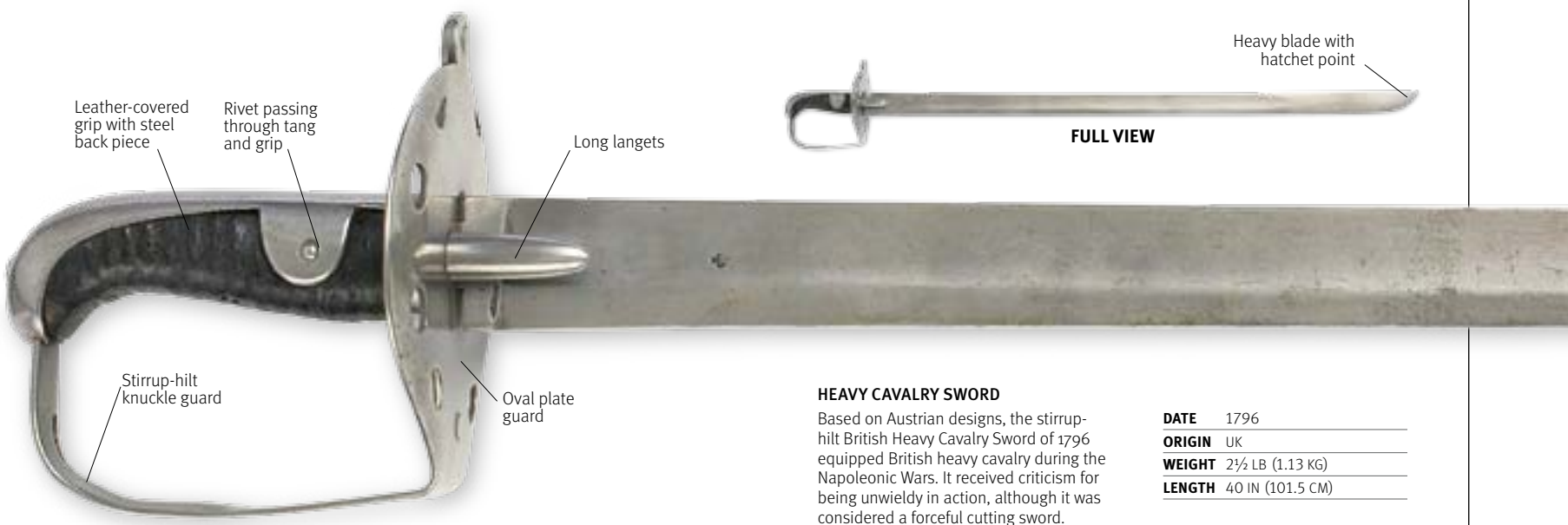


FULL VIEW

MODEL AN IV CAVALRY SWORD

Known as the Model An IV (Year 4, after the French Revolutionary calendar) this sword equipped some French heavy cavalry and dragoons during the Napoleonic period. It has a long blade, which, like other French swords, was narrower than its British equivalent.

DATE	1794
ORIGIN	FRANCE
WEIGHT	2½ LB (1.16 KG)
LENGTH	44½ IN (113 CM)



Leather-covered grip with steel back piece

Rivet passing through tang and grip

Long langets

Stirrup-hilt knuckle guard

Oval plate guard

Heavy blade with hatchet point



FULL VIEW

HEAVY CAVALRY SWORD

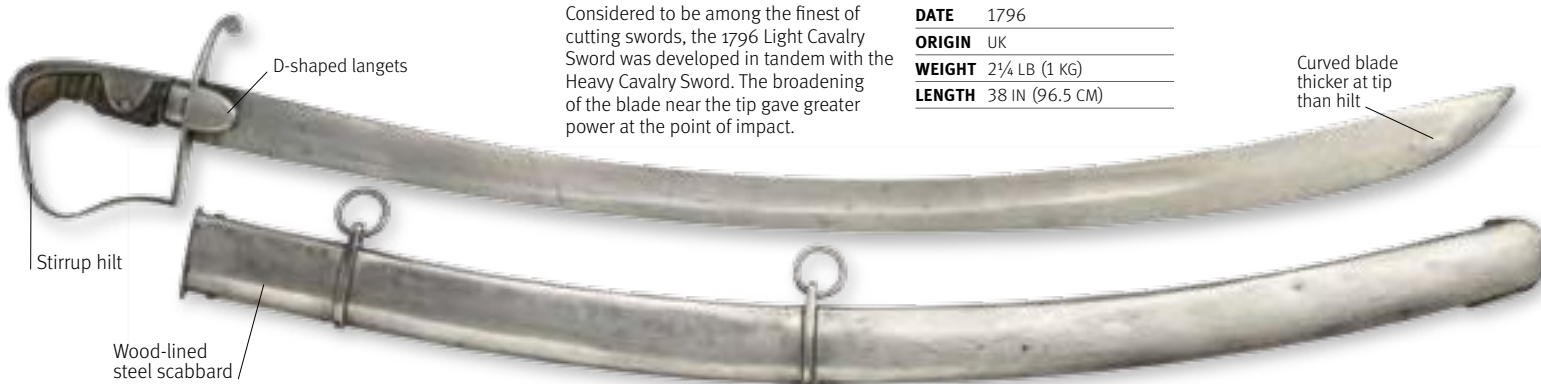
Based on Austrian designs, the stirrup-hilt British Heavy Cavalry Sword of 1796 equipped British heavy cavalry during the Napoleonic Wars. It received criticism for being unwieldy in action, although it was considered a forceful cutting sword.

DATE	1796
ORIGIN	UK
WEIGHT	2½ LB (1.13 KG)
LENGTH	40 IN (101.5 CM)

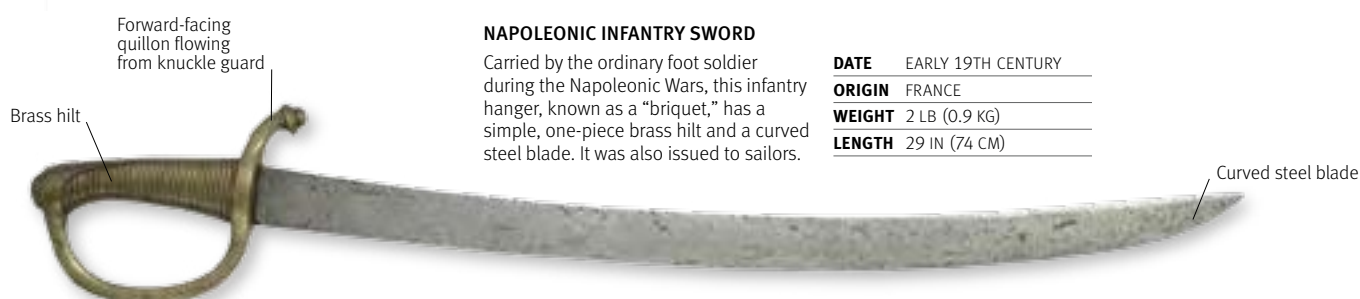
EUROPEAN SWORDS

1796 LIGHT CAVALRY SWORD

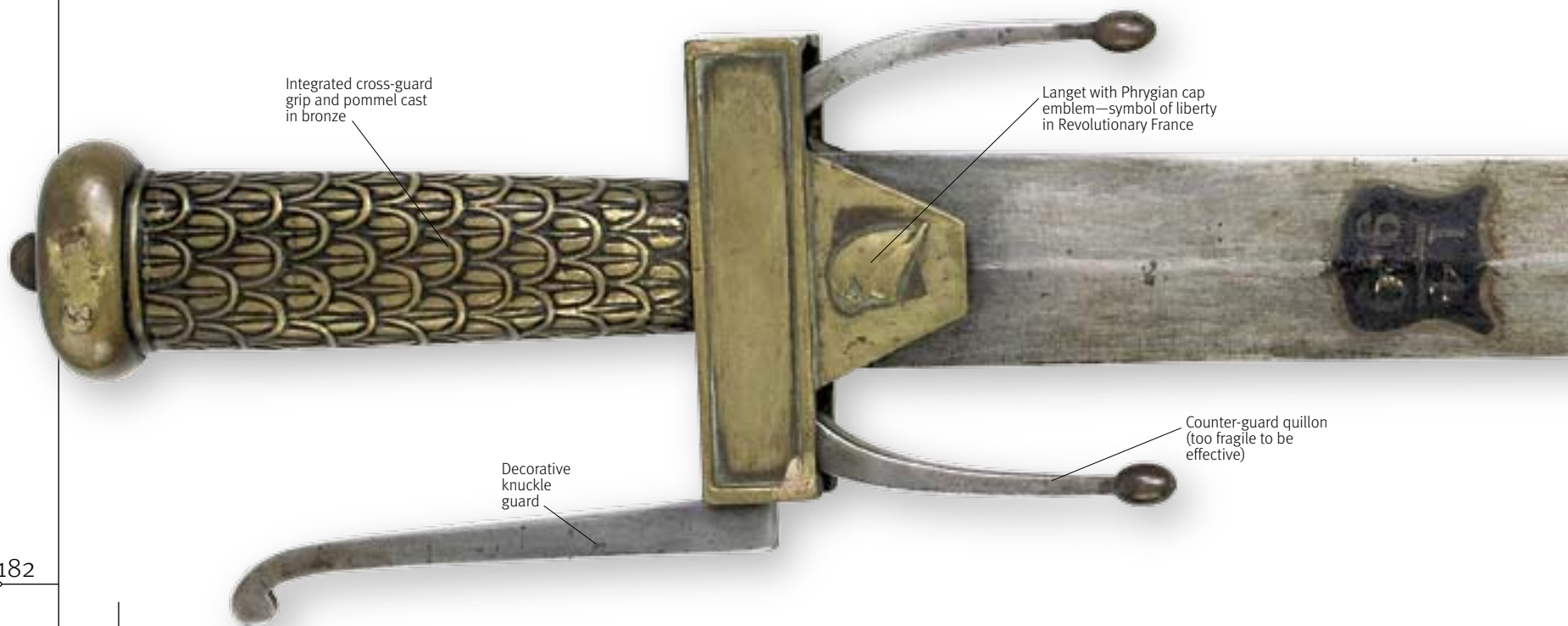
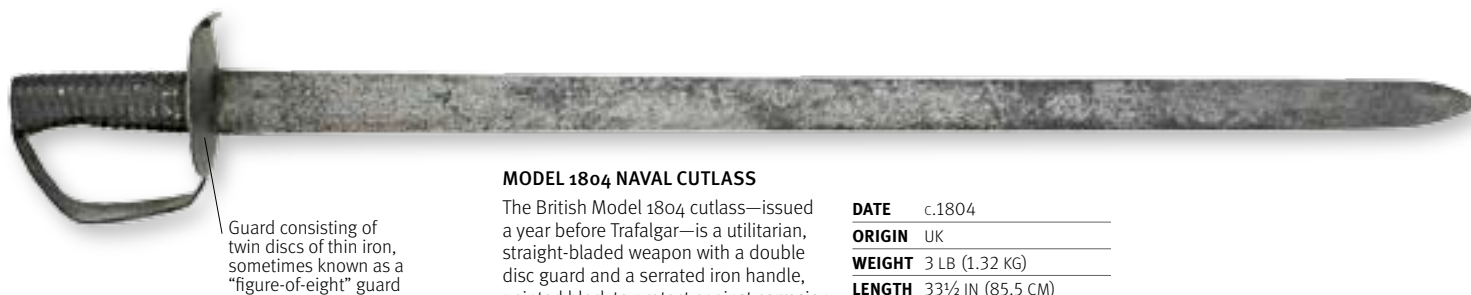
Considered to be among the finest of cutting swords, the 1796 Light Cavalry Sword was developed in tandem with the Heavy Cavalry Sword. The broadening of the blade near the tip gave greater power at the point of impact.

DATE 1796**ORIGIN** UK**WEIGHT** 2¼ LB (1 KG)**LENGTH** 38 IN (96.5 CM)**NAPOLEONIC INFANTRY SWORD**

Carried by the ordinary foot soldier during the Napoleonic Wars, this infantry hanger, known as a “briquet,” has a simple, one-piece brass hilt and a curved steel blade. It was also issued to sailors.

DATE EARLY 19TH CENTURY**ORIGIN** FRANCE**WEIGHT** 2 LB (0.9 KG)**LENGTH** 29 IN (74 CM)**MODEL 1804 NAVAL CUTLASS**

The British Model 1804 cutlass—issued a year before Trafalgar—is a utilitarian, straight-bladed weapon with a double disc guard and a serrated iron handle, painted black to protect against corrosion.

DATE c.1804**ORIGIN** UK**WEIGHT** 3 LB (1.32 KG)**LENGTH** 33½ IN (85.5 CM)



"Crowing cockerel" pommel



FULL VIEW

PIONEER SWORD

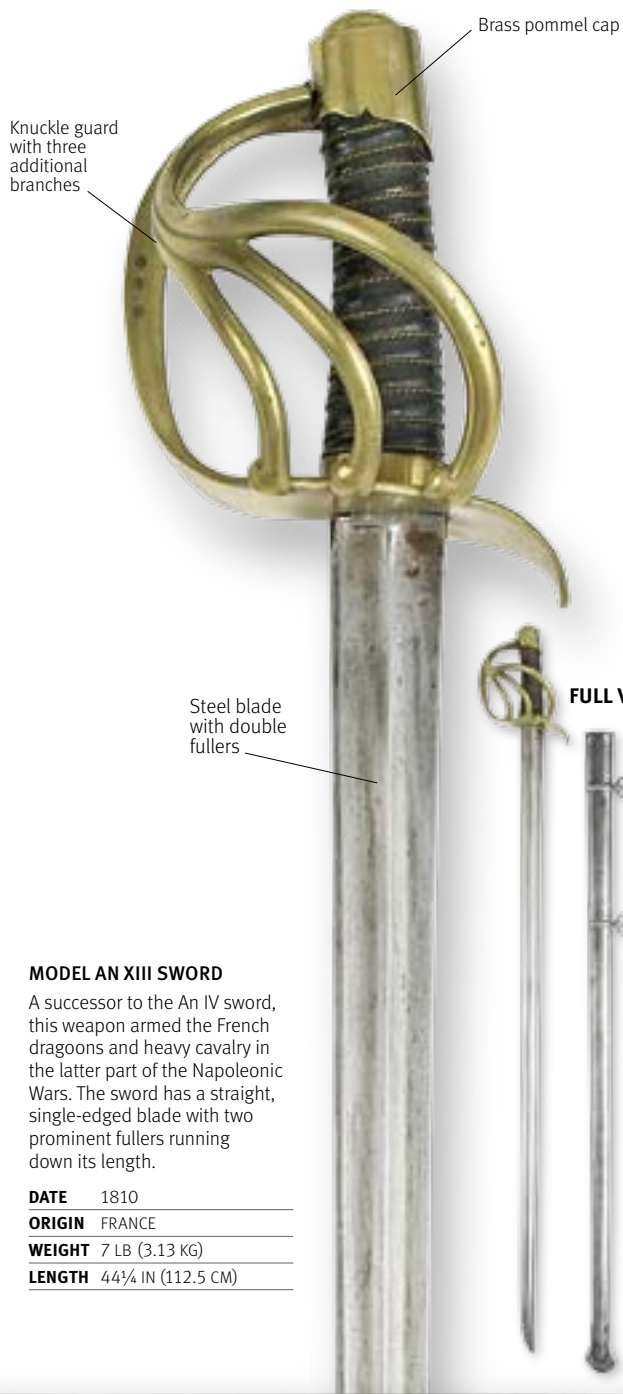
The sword's one-piece brass hilt is surmounted by a crowing rooster figure that acts as the pommel. The steel blade includes a serrated or sawback edge—found on pioneer swords—and is slightly curved with a point reminiscent of a falchion.

DATE	c.1800
ORIGIN	FRANCE
WEIGHT	2¾ LB (1.22 KG)
LENGTH	32 IN (81 CM)

Brass cross-guard with downward-curving quillons

Curved, single-edged steel blade with serrated edge

Unsharpened, double-edged blade with blunt point



Brass pommel cap

Knuckle guard with three additional branches

Steel blade with double fullers



FULL VIEW

MODEL AN XIII SWORD

A successor to the An IV sword, this weapon armed the French dragoons and heavy cavalry in the latter part of the Napoleonic Wars. The sword has a straight, single-edged blade with two prominent fullers running down its length.

DATE	1810
ORIGIN	FRANCE
WEIGHT	7 LB (3.13 KG)
LENGTH	44¼ IN (112.5 CM)



FULL VIEW

CEREMONIAL CADET SWORD

This ceremonial sword, designed by artist Jacques Louis David, followed the classical Roman model popular at the time, and was issued to students of the French military academy.

DATE	1794
ORIGIN	FRANCE
WEIGHT	2 LB (0.90 KG)
LENGTH	26½ IN (67 CM)

AMERICAN CIVIL WAR SWORDS

THE ARMORERS OF the new US Republic followed patterns for swordmaking from a mixture of German, French, and British sources. But from the 1840s onward, US swords were based almost exclusively on French designs, and it was these swords that armed the soldiers of the American Civil War (1861–65). While the forces of the Union North were well supplied with arms and equipment, the Confederate armies of the South were short of weapons of all kinds, including swords. They were forced to rely on captured Union stocks, foreign sources, and their own home-produced weapons.



MODEL 1850 "FOOT" OFFICER'S SWORD

This sword would have equipped officers on both sides during the Civil War, and was very similar to the Model 1850 "Mounted" Field and Staff Officer's Sword. Influenced by French patterns, this sword has a brass hilt and a grip made either from leather or the skin of a ray or shark—material which gave a very good grip. The single-edged blade is slightly curved.

DATE c.1850

ORIGIN US

WEIGHT 2 LB (1.13 KG)

LENGTH 31 IN (78.75 CM)



FULL VIEW

Single-edged blade with sharpened "false edge"

Knuckle guard

Leather grip wrapped in twisted brass wire

Guard branches

Guard with the upper quillon swept forward

MODEL 1860 LIGHT CAVALRY SABER

The Model 1840 Light Cavalry Saber was a heavy, powerful sword whose weight made it unpopular with the troopers, who nicknamed it "Old Wrist Breaker." Its replacement, the Model 1860 Light Cavalry Saber, was not considered much of an improvement, although it was an effective thrusting and hacking weapon.

DATE c.1860

ORIGIN US

WEIGHT 3 LB (1.36 KG)

LENGTH 35 IN (90 CM)



FULL VIEW

"False edge"

Ricasso (unsharpened upper part of the sword)

MODEL 1850 INFANTRY SWORD

Edged weapons like this Model 1850 "Foot" Officer's Sword equipped the majority of infantry officers on the Union side. By the time of the American Civil War, officers would rarely have used a sword in actual combat, but such was its potency that it continued to be worn throughout the 19th century as a symbol of rank.

DATE c.1850

ORIGIN US

WEIGHT 2 LB (1.13 KG)

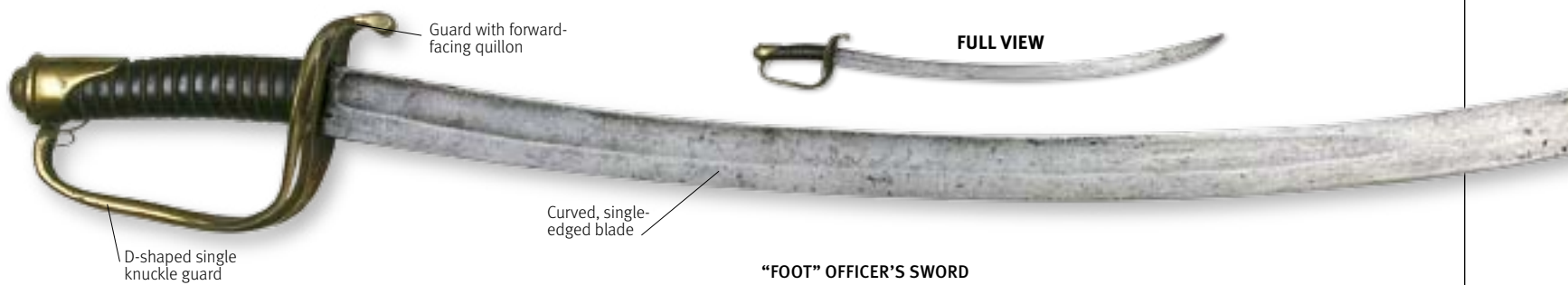
LENGTH 30 IN (76.8 CM)



FULL VIEW

Leather grip wrapped in twisted brass wire

Engraved detail on brass hilt



“FOOT” OFFICER’S SWORD

The artillery had its own distinctive swords. This Confederate artillery saber was made by Boyle, Gamble & McFee, who were based in Richmond, Virginia, and the blade dates from the 1820s. The sword was used by General William Miller of the 1st Florida Regiment.

DATE	c.1820
ORIGIN	US
WEIGHT	2 LB (1.13 KG)
LENGTH	29 IN (73.6 CM)



CONFEDERATE CAVALRY SABER

The Confederate States of America manufactured many thousands of swords based on both the 1840 and 1860 models of cavalry saber. Although an essential part of any cavalryman’s equipment, on the battlefield, the sword was being replaced by the carbine and revolver.

DATE	c.1850
ORIGIN	US
WEIGHT	3 LB (1.56 KG)
LENGTH	35 IN (89 CM)



MODEL 1850 INFANTRY SWORD

The Model 1850 “Foot” Officer’s Sword was not only a functional weapon of war, it was also an object of the finest craftsmanship, with intricate detail a feature of the hilt. The sword was carried by company grade officers in the infantry, and continued in service until the early 1870s when it was replaced by the Model 1860 sword.

DATE	c.1850
ORIGIN	US
WEIGHT	2 LB (1.13 KG)
LENGTH	30 IN (76 CM)



CONFEDERATE SWORD

The subscription purchase of weapons for popular officers was a feature of military life, and this fine sword, made by Leech & Rigdon, was presented in 1864 to General D. W. Adams of the Confederate Army by the men under his command.

DATE	c.1860
ORIGIN	US
WEIGHT	2 LB (1.13 KG)
LENGTH	30 IN (76.2 CM)

OTTOMAN EMPIRE SWORDS

THE OTTOMAN EMPIRE, at its height from the 15th to the 17th century, was founded by Turks who migrated to Anatolia from central Asia. Their curved swords reflect these origins, being derived from the central Asian Turko-Mongolian saber of the 13th century. Europeans encountered these curved blades in wars with the Ottomans, and collectively termed them “scimitars.” Many of the swords shown here date from the 19th century, but they are typical of the Ottoman Empire at its peak. Similar weapons were used across the Islamic world, from North Africa to Persia and India.



PERSIAN KILIJ

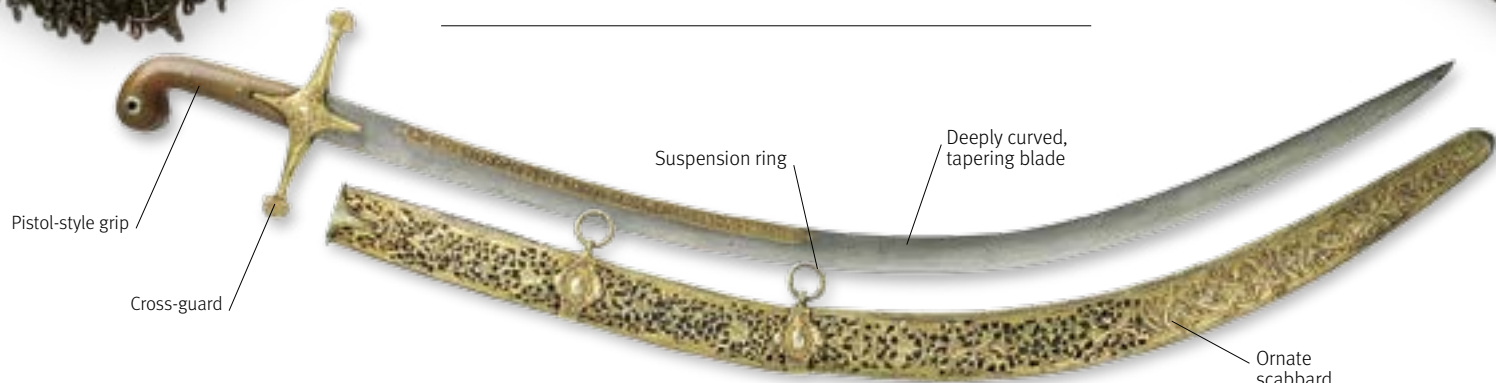
Persian craftsmen were acknowledged masters of sword making. The *kilij* was first used in the Ottoman Empire in the 15th century. Over time, its blade showed many variations. This example has a deep curve cut away along its back edge, and flares into a *yelman* toward the point.

DATE EARLY 19TH CENTURY

ORIGIN PERSIA

WEIGHT 1¼ LB (0.6 KG)

LENGTH 32 IN (81 CM)



SHAMSHIR

The form of saber known as a *shamshir* spread from Persia in the 16th century. Its blade had the curve of a *kilij*, but tapered to a point. It was a fearsome slashing weapon, whether used on foot or horseback. A horseman could also use the point to run an enemy foot soldier through.

DATE EARLY 19TH CENTURY

ORIGIN ARMENIA

WEIGHT 1½ LB (0.71 KG)

LENGTH 37 IN (94 CM)



Chape embossed with flowers and foliage

Forward-curving blade

Silver locket

TURKISH YATAGHAN

A *yataghan* has a type of forward-curving blade known as a *kopis* blade, after the Ancient Greek sword of that name. The *yataghan* is allied to the Indian *sosun pattah* and the Nepalese *kukhri*. This late Ottoman example is identical in style to those used when the empire was at its height. The wooden scabbard is clad in leather.

DATE	MID-19TH CENTURY
ORIGIN	TURKEY
WEIGHT	1¼ LB (0.6 KG)
LENGTH	29 IN (74 CM)



Gold inscription from the Koran

TURKISH SABER

This ornate Ottoman sword bears the name of the master swordsmith who made its blade: Haji Gafur. Swords in the Islamic world were frequently inscribed with prayers and texts from the Koran.

DATE	EARLY 19TH CENTURY
ORIGIN	TURKEY
WEIGHT	1¾ LB (0.81 KG)
LENGTH	38 IN (96 CM)



Turquoise set into scabbard



Silver-covered hilt

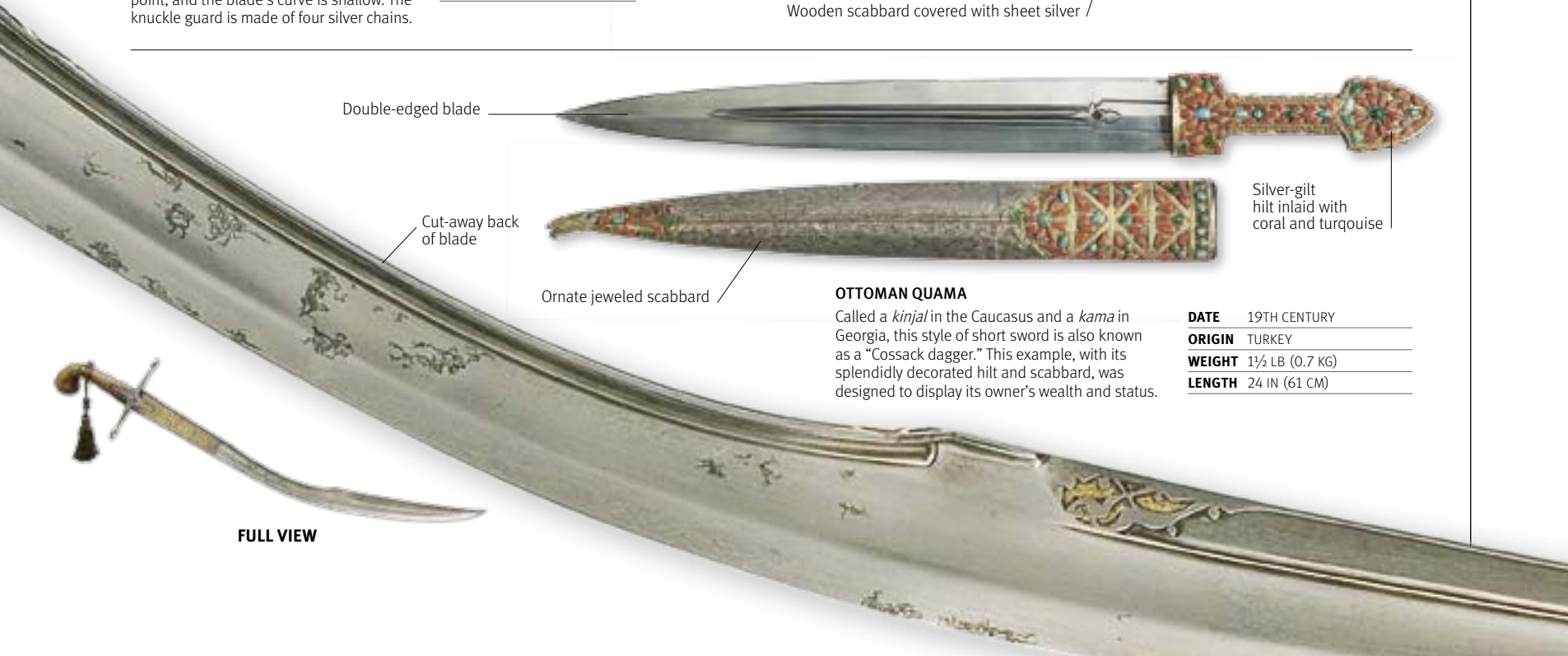
Narrow fuller on back of blade

Wooden scabbard covered with sheet silver

NORTH AFRICAN SAIF

Saif is simply an Arabic word for sword. This example is from North Africa, part of the Ottoman Empire from the 16th century. Unlike a *shamshir*, it does not taper to a point, and the blade's curve is shallow. The knuckle guard is made of four silver chains.

DATE	LATE 18TH CENTURY
ORIGIN	NORTH AFRICA
WEIGHT	1½ LB (0.7 KG)
LENGTH	32¾ IN (83.5 CM)



Double-edged blade

Cut-away back of blade

Ornate jeweled scabbard

Silver-gilt hilt inlaid with coral and turquoise

OTTOMAN QUAMA

Called a *kinjal* in the Caucasus and a *kama* in Georgia, this style of short sword is also known as a "Cossack dagger." This example, with its splendidly decorated hilt and scabbard, was designed to display its owner's wealth and status.

DATE	19TH CENTURY
ORIGIN	TURKEY
WEIGHT	1½ LB (0.7 KG)
LENGTH	24 IN (61 CM)

FULL VIEW

CHINESE AND TIBETAN SWORDS

FOR THE CHINESE, the four major weapons of a fighting man were the staff, the spear, and two swords: the single-edged *dao* and the double-edged *jian*. While the straight-bladed *jian* was the more prestigious of the two sword types, the curved *dao* was more practical and easier to use. As in Europe, by the 19th century swords in China were becoming primarily ceremonial items. The military tradition of Tibet is often forgotten, but the Tibetans fought many wars and developed their own significant tradition of sword manufacture, which was loosely related to Chinese models.



CHINESE DAO

Dating from the last century of the Ming dynasty, the single-edged, curved blade of this *dao* shows its affinity with Indian *talwars* and *shamshirs*, and with European sabers. The blade is of the form known as *liuyedao* (willow-leaf knife), with a longer, deeper curve than the *yanmaodao* (goose-quill knife), which can be seen below.

DATE 1572–1620

ORIGIN CHINA

WEIGHT 3 LB (1.35 KG)

LENGTH 41½ IN (105.7 CM)



CHINESE DAO

This short *dao* has a near-straight *yanmaodao* blade. Primarily a cavalry weapon, its single edge was used for slashing, and its point for running through. The blade was layered, in a similar fashion to Japanese swords. The core of hard steel, which was exposed at the cutting edge, was sandwiched between layers of softer steel.

DATE 17TH CENTURY

ORIGIN CHINA

WEIGHT 1¼ LB (0.52 KG)

LENGTH 25¼ IN (64 CM)



CHINESE JIAN

With its straight, double-edged blade, the *jian* was the weapon chosen by Chinese swordsmen to show off their skills. It was also worn by high officials and officers as part of their ceremonial regalia. This *jian* sword dates from the reign of emperor Qianlong, of the Manchu Qing dynasty.

DATE 1736–95

ORIGIN CHINA

WEIGHT 2¾ LB (1.25 KG)

LENGTH 42¼ IN (107.1 CM)



FULL VIEW



Lacquered scabbard



Blade ends in rounded point

Lobed pommel with turquoise bead

Iron guard

Straight, single-edged, mixed-steel blade

TIBETAN SWORD

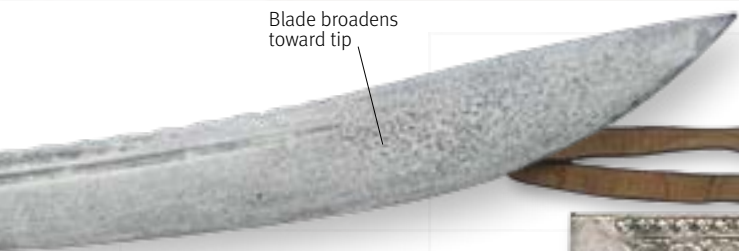
The long blade of this Tibetan sword exhibits elaborate swirled patterns of mixed steels on both faces. This was a weapon for a high-status individual, evidenced by the highly decorated pommel and the grip wrapped in silver wire.

DATE 18TH CENTURY

ORIGIN TIBET

WEIGHT 2 LB (0.95 KG)

LENGTH 39¾ IN (101 CM)



Blade broadens toward tip

Embossed gilded panel

Coral bead



Silver-sheet quillon block

Blade's single cutting edge is irregular and crudely angled

TIBETAN SWORD

A large and elaborate sword with a poor quality blade, this was undoubtedly intended primarily for ceremonial use. The scabbard—which is made of wood and covered in brown leather—is finely decorated with silver, gilding, and coral.

DATE 19TH CENTURY

ORIGIN TIBET

WEIGHT 2¼ LB (1 KG)

LENGTH 38½ IN (98 CM)



Hard-steel edge



Scabbard with embossed gilded panels



Trilobed pommel

Central ridge

CHINESE JIAN

In the 19th century, the declining Qing Empire was obsessed with developing firearms to match those of Europe. Though somewhat neglected, swords continued in use as weapons and ceremonial arms. This sword has the diamond profile of the traditional *jian* blade.

DATE 19TH CENTURY

ORIGIN CHINA

WEIGHT 2¼ LB (1 KG)

LENGTH 30¾ IN (77.8 CM)



Cutting edge

Blade decorated with silver inlay



Leather strap

