

# Bow and arrow

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The **bow and arrow** is a projectile weapon system (a bow with arrows) that predates recorded history and is common to most cultures. Archery is the art, practice, or skill of applying it.

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A modern reconstruction, in fiberglass and wood, of a historical composite bow

## Description

A bow is a flexible arc which shoots aerodynamic projectiles called arrows. A string joins the two ends of the bow and when the string is drawn back, the ends of the bow are flexed. When the string is released, the potential energy of the flexed stick is transformed into the kinetic energy of the arrow.<sup>[1]</sup>

Archery is the art or sport of shooting arrows from bows.<sup>[2]</sup>

Today, bows and arrows are used primarily for hunting and for the sport of archery. Although they are still occasionally used as weapons of war, the development of gunpowder and muskets, and the growing size of armies, led to their replacement in warfare several centuries ago in much of the world.

Someone who makes bows is known as a bowyer,<sup>[3]</sup> and one who makes arrows is a fletcher<sup>[4]</sup>—or in the case of the manufacture of metal arrow heads, an arrowsmith.<sup>[5]</sup>

## History

The bow and arrow appears around the transition from the Upper Paleolithic to the Mesolithic. At the site of Nataruk in Turkana County, Kenya, obsidian bladelets found embedded in a skull and within the thoracic cavity of another skeleton, suggest the use of stone-tipped arrows as weapons.<sup>[6]</sup> After the end of the last glacial period, use of the bow seems to have spread to every inhabited continent, including the New World, except for Australia.<sup>[7]</sup>

The oldest extant bows in one piece are the elm Holmegaard bows from Denmark which were dated to 9,000 BCE. High-performance wooden bows are currently made following the Holmegaard design. The Stellmoor bow fragments from northern Germany were dated to about 8,000 BCE, but they were destroyed in Hamburg during the Second World War, before carbon 14 dating was available; their age is attributed by archaeological association.<sup>[8]</sup> Microliths discovered on the south coast of Africa suggest that arrows may be at least 71,000 years old.<sup>[9]</sup>

The bow was an important weapon for both hunting and warfare from prehistoric times until the widespread use of gunpowder in the 16th century. Organised warfare with bows ended in the mid 17th century in Europe, but it persisted into the early 19th century in Eastern cultures and in tribal warfare in the New World. It has recently been used as a weapon of tribal warfare in some parts of Sub-Saharan Africa; an example was documented in 2009 in Kenya when Kisii people and Kalenjin people clashed, resulting in four deaths.<sup>[10][11]</sup>

The British upper class led a revival of archery from the late 18th century.<sup>[12]</sup> Sir Ashton Lever, an antiquarian and collector, formed the Toxophilite Society in London in 1781, under the patronage of George, the Prince of Wales.

## Construction

### Parts of the bow

The basic elements of a bow are a pair of curved elastic limbs, traditionally made from wood, joined by a riser. Both ends of the limbs are connected by a string known as the bow string.<sup>[1]</sup> By pulling the string backwards the archer exerts compressive force on the string-facing section, or belly, of the limbs as well as placing the outer section, or back, under tension. While the string is held, this stores the energy later released in putting the arrow to flight. The force required to hold the string stationary at full draw is often used to express the power of a bow, and is known as its draw weight, or weight.<sup>[13][14]</sup> Other things being equal, a higher draw weight means a more powerful bow, which is able to project heavier arrows at the same velocity or the same arrow at a greater velocity.

The various parts of the bow can be subdivided into further sections. The topmost limb is known as the upper limb, while the bottom limb is the lower limb. At the tip of each limb is a nock, which is used to attach the bowstring to the limbs. The riser is usually divided into the grip, which is held by the archer,



Scythians shooting with bows, Panticapeum (modern Kertch), 4th century BCE.

as well as the arrow rest and the bow window. The arrow rest is a small ledge or extension above the grip which the arrow rests upon while being aimed. The bow window is that part of the riser above the grip, which contains the arrow rest.<sup>[1]</sup>

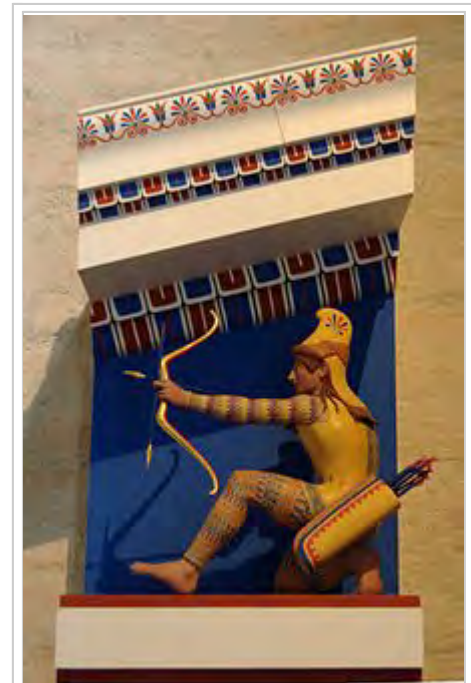
In bows drawn and held by hand, the maximum draw weight is determined by the strength of the archer.<sup>[14]</sup> The maximum distance the string could be displaced and thus the longest arrow that could be loosed from it, a bow's draw length, is determined by the size of the archer.<sup>[15]</sup>

A composite bow uses a combination of materials to create the limbs, allowing the use of materials specialized for the different functions of a bow limb. The classic composite bow uses wood for lightness and dimensional stability in the core, horn to store energy in compression, and sinew for its ability to store energy in tension. Such bows, typically Asian, would often use a stiff end on the limb end, having the effect of a recurve.<sup>[16]</sup> In this type of bow, this is known by the Arabic name 'siyah'.<sup>[17]</sup>

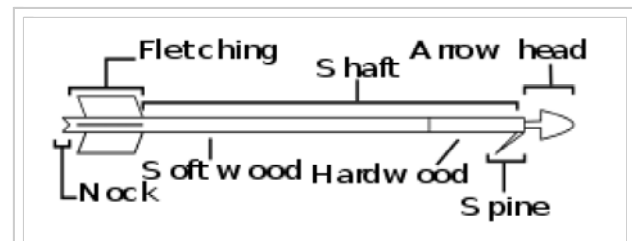
Modern construction materials for bows include laminated wood, fiberglass, metals,<sup>[18]</sup> and carbon fiber components.

## Arrows

An arrow usually consists of a shaft with an arrowhead attached to the front end, with fletchings and a nock at the other.<sup>[19]</sup> Modern arrows are usually made from carbon fibre, aluminum, fiberglass, and wood shafts. Carbon shafts have the advantage that they do not bend or warp, but they can often be too light weight to shoot from some bows and are expensive. Aluminum shafts are less expensive than carbon shafts, but they can bend and warp from use. Wood shafts are the least expensive option but often will not be identical in weight and size to each other and break more often than the other types of shafts.<sup>[20]</sup> Arrow sizes vary greatly across cultures and range from very short ones that require the use of special equipment to be shot to ones in use in the Amazon River jungles that are 8.5 feet (2.6 metres) long. Most modern arrows are 22 inches (56 cm) to 30 inches (76 cm) in length.<sup>[19]</sup>



Polychrome small-scale model of the archer XI of the west pediment of the Temple of Aphaea, ca. 505–500 BCE.



Schematic of an arrow showing its parts.

Arrows come in many types, among which are breasted, bob-tailed, barrelled, clout, and target.<sup>[19]</sup> A breasted arrow is thickest at the area right behind the fletchings, and tapers towards the nock and head.<sup>[21]</sup> A bob-tailed arrow is thickest right behind the head, and tapers to the nock.<sup>[22]</sup> A barrelled arrow is thickest in the centre of the arrow.<sup>[23]</sup> Target arrows are those arrows used for target shooting rather than warfare or hunting, and usually have simple arrowheads.<sup>[24]</sup>

For safety reasons, a bow should never be shot without an arrow nocked; without an arrow, the energy that is normally transferred into the projectile is instead directed back into the bow itself, which will cause damage to the bow's limbs.

## Arrowheads

The end of the arrow that is designed to hit the target is called the arrowhead. Usually, these are separate items that are attached to the arrow shaft by either tangs or sockets. Materials used in the past for arrowheads include flint, bone, horn, or metal. Most modern arrowheads are made of steel, but wood and other traditional materials are still used occasionally. A number of different types of arrowheads are known, with the most common being bodkins, broadheads, and piles.<sup>[25]</sup> Bodkin heads are simple spikes made of metal of various shapes, designed to pierce armour.<sup>[22]</sup> A broadhead arrowhead is usually triangular or leaf-shaped and has a sharpened edge or edges. Broadheads are commonly used for hunting.<sup>[26]</sup> A pile arrowhead is a simple metal cone, either sharpened to a point or somewhat blunt, that is used mainly for target shooting. A pile head is the same diameter as the arrow shaft and is usually just fitted over the tip of the arrow.<sup>[27]</sup> Other heads are known, including the blunt head, which is flat at the end and is used for hunting small game or birds, and is designed to not pierce the target nor embed itself in trees or other objects and make recovery difficult.<sup>[22]</sup> Another type of arrowhead is a barbed head, usually used in warfare or hunting.<sup>[19]</sup>

## Bowstrings

Bowstrings may have a nocking point marked on them, which serves to mark where the arrow is fitted to the bowstring before shooting.<sup>[28]</sup> The area around the nocking point is usually bound with thread to protect the area around the nocking point from wear by the archer's hands. This section is called the serving.<sup>[29]</sup> At one end of the bowstring a loop is formed, which is permanent. The other end of the bowstring also has a loop, but this is not permanently formed into the bowstring but is constructed by tying a knot into the string to form a loop. Traditionally this knot is known as the archer's knot, but is a form of the timber hitch. The knot can be adjusted to lengthen or shorten the bowstring. The adjustable loop is known as the "tail".<sup>[30]</sup> The string is often twisted (this being called the "flemish twist").

Bowstrings have been constructed of many materials throughout history, including fibres such as flax, silk, and hemp.<sup>[31]</sup> Other materials used were animal guts, animal sinews, and rawhide. Modern fibres such as Dacron or Kevlar are now used in commercial bowstring construction, as well as steel wires in some compound bows.<sup>[32]</sup> Compound bows have a mechanical system of pulley cams over which the bowstring is wound.<sup>[29]</sup> Nylon is useful only in emergency situations, as it stretches too much.<sup>[33]</sup>

## Types of bow

There is no one accepted system of classification of bows.<sup>[34]</sup>

Bows may be described by various characteristics including the materials used, the length of the draw that they permit, the shape of the bow in sideways view, and the shape of the limb in cross-section.<sup>[35]</sup>

Common types of bow include

- Recurve bow: a bow with the tips curving away from the archer. The curves straighten out as the bow is drawn and the return of the tip to its curved state after release of the arrow adds extra velocity to the arrow.<sup>[36]</sup>
- Reflex bow: a bow whose entire limbs curve away from the archer when unstrung. The curves are opposite to the direction in which the bow flexes while drawn.<sup>[36]</sup>
- Self bow: a bow made from one piece of wood.<sup>[29]</sup>
- Longbow: a self bow with limbs rounded in cross-section, about the same height as the archer so as to allow a full draw, usually over 5 feet (1.5 metres) long. The traditional English longbow was usually made of yew wood, but other woods are also used.<sup>[37]</sup>
- Flatbow: the limbs are approximately rectangular in cross-section. This was traditional in many Native American societies and was found to be the most efficient shape for bow limbs by American engineers in the 20th century.
- Composite bow: a bow made of more than one material.<sup>[35]</sup>
- Takedown bow: a bow that can be demounted for transportation, usually consisting of 3 parts: 2 limbs and a Riser.
- Compound bow: a bow with mechanical aids to help with drawing the bowstring. Usually, these aids are pulleys at the tips of the limbs.<sup>[38]</sup>



Bow and arrow in heraldry

## Crossbow

In a crossbow, the limbs of the bow, called a **prod**, are attached at right angles to a crosspiece or stock in order to allow for mechanical pulling and holding of the string. The mechanism that holds the drawn string has a release or trigger that allows the string to be released.<sup>[39]</sup> A crossbow shoots a "bolt" or "quarrel", rather than an arrow.<sup>[40]</sup>

## Citations

- Collins, Desmond (1973). *Background to archaeology: Britain in its European setting* (Revised ed.). Cambridge University Press. ISBN 0-521-20155-1.
- Elmer, R. P. (1946). *Target Archery: With a History of the Sport in America*. New York: A. A. Knopf. OCLC 1482628.

- Heath, E. G. (1978). *Archery: The Modern Approach*. London: Faber and Faber. ISBN 0-571-04957-5.
- Paterson, W. F. (1984). *Encyclopaedia of Archery*. New York: St. Martin's Press. ISBN 0-312-24585-8.
- Sorrells, Brian J. (2004). *Beginner's Guide to Traditional Archery*. Mechanicsburg, PA: Stackpole Books. ISBN 978-0-8117-3133-1.
- Stone, George Cameron (1999) [1934]. *A Glossary of the Construction, Decoration, and Use of Arms and Armor in All Countries and in All Times* (Reprint ed.). Mineola: Dover Publications. ISBN 0-486-40726-8.

## References

1. Paterson *Encyclopaedia of Archery* pp. 27-28
2. Paterson *Encyclopaedia of Archery* p. 17
3. Paterson *Encyclopaedia of Archery* p. 31
4. Paterson *Encyclopaedia of Archery* p. 56
5. Paterson *Encyclopaedia of Archery* p. 20
6. Lahr, M. Mirazón; Rivera, F.; Power, R. K.; Mounier, A.; Copsey, B.; Crivellaro, F.; Edung, J. E.; Fernandez, J. M. Maillo; Kiarie, C. (2016). "Inter-group violence among early Holocene hunter-gatherers of West Turkana, Kenya". *Nature*. **529** (7586): 394–398. doi:10.1038/nature16477. PMID 26791728.
7. M. H. Monroe, *Aboriginal Weapons and Tools* "The favoured weapon of the Aborigines was the spear and spear thrower. The fact that they never adopted the bow and arrow has been debated for a long time. During post-glacial times the bow and arrow were being used in every inhabited part of the world except Australia. A number of reasons for this have been put forward [...] Captain Cook saw the bow and arrow being used on an island close to the mainland at Cape York, as it was in the Torres Strait islands and New Guinea. But the Aborigines preferred the spear. "
8. Collins *Background to Archaeology*
9. Brown, Kyle S.; Marean, Curtis W.; et al. "An early and enduring advanced technology originating 71,000 years ago in South Africa". *Nature*. **491** (7425): 590–593. doi:10.1038/nature11660.
10. "Archived copy". Archived from the original on 2012-12-09. Retrieved 2012-11-16. Bow and arrow-warfare in today's Africa
11. <http://www.time.com/time/photogallery/0,29307,17>
12. Johnes, Martin. "Archery—Romance-and-Elite-Culture-in-England-and-Wales—c-1780-1840 Martin Johnes. Archery, Romance and Elite Culture in England and Wales, c. 1780–1840". Swansea.academia.edu. Retrieved 2013-03-26.
13. Paterson *Encyclopaedia of Archery* p. 111
14. Sorrells *Beginner's Guide* pp. 20-21
15. Sorrells *Beginner's Guide* pp. 19-20
16. Paterson *Encyclopaedia of Archery* p. 38
17. Elmer *Target Archery*
18. Heath *Archery* pp. 15-18
19. Paterson *Encyclopaedia of Archery* pp. 18-19
20. Sorrells *Beginner's Guide* pp. 21-22
21. Paterson *Encyclopaedia of Archery* p. 32
22. Paterson *Encyclopaedia of Archery* pp. 25-26
23. Paterson *Encyclopaedia of Archery* p. 24
24. Paterson *Encyclopaedia of Archery* p. 103
25. Paterson *Encyclopaedia of Archery* p. 19
26. Paterson *Encyclopaedia of Archery* p. 33
27. Paterson *Encyclopaedia of Archery* p. 85
28. Paterson *Encyclopaedia of Archery* p. 80
29. Paterson *Encyclopaedia of Archery* pp. 93-94
30. Heath *Archery* pp. 27-28
31. Grow your own bowstring (<http://www.primitiveways.com/bowstring.html>)
32. Paterson *Encyclopaedia of Archery* pp. 28-29
33. Paracord 550 used as bow string (<http://diyready.com/diy-how-to-make-a-bow-weapons-pvc-fiberglass-bow/>)
34. Paterson *Encyclopaedia of Archery* p. 37
35. Heath *Archery* pp. 14-16
36. Paterson *Encyclopaedia of Archery* pp. 90-91
37. Paterson *Encyclopaedia of Archery* pp. 73-75
38. Paterson *Encyclopaedia of Archery* pp. 38-40
39. Paterson *Encyclopaedia of Archery* p. 41
40. Paterson *Encyclopaedia of Archery* p. 26

## Further reading

- Gad Rausing, "The Bow", Lund University Acta Archaeologica Lundensia Serie in 8° No 6, 1967
- *The Traditional Bowyers Bible Volume 1*. 1992 The Lyons Press. ISBN 1-58574-085-3
- *The Traditional Bowyers Bible Volume 2*. 1992 The Lyons Press. ISBN 1-58574-086-1
- *The Traditional Bowyers Bible Volume 3*. 1994 The Lyons Press. ISBN 1-58574-087-X
- *The Traditional Bowyers Bible Volume 4*. 2008 The Lyons Press. ISBN 978-0-9645741-6-8
- U. Stodiek/H. Paulsen, "Mit dem Pfeil, dem Bogen..." Techniken der steinzeitlichen Jagd. (Oldenburg 1996).
- Gray, David, "Bows of the World". The Lyons Press, 2002. ISBN 1-58574-478-6.
- Comstock, Paul. "The Bent Stick"

## External links

- The Asian Traditional Archery Research Network (<http://www.atarn.org>)
- Simon Archery Collection



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(<http://www.museum.manchester.ac.uk/collection/archery/>) From The Manchester Museum, The University of Manchester

- An Approach to the Study of Ancient Archery using Mathematical Modeling (<http://www.bio.vu.nl/thb/users/kooi/kobe97.pdf>)

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