COLORADO MILITARY HISTORIANS

NEWSLETTER

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A Comparison between Composite and Long Bows

By Larry Irons

Introduction

I am tired of people telling me that the Mongol composite bow is superior to all other bows just because it is a Mongol horseman using it. I am a scientist and I refuse to believe that is the reason. I want to know if it really is superior and I want to know why. I don't believe that there is a genetic reason. I also have a prejudice against Indian longbowmen. I don't believe that a cane bow is superior to other bows.

So let's look at the different kinds of bows and the physics of bows. We will also look at how training and experience will affect the archer's effectiveness. I have been trained as an archer and I have interviewed some modern bow hunters to build an understanding of the methods, conditioning, and training involved in bow hunting. I believe that this information is valid in attempting to understand ancient and medieval military archery.

Classification of Bows

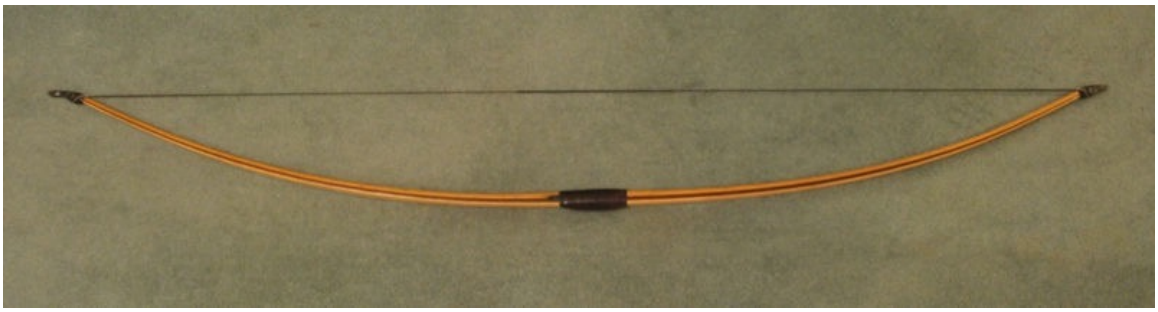
A bow can be classified by the length of the bow staff and the construction. This is the classification that I am using:

1. Self bows – A bow made of a one-piece staff of wood less than 5 feet in length.
2. Longbow - A bow made of a one-piece staff of wood more than 5 feet in length.
3. Composite bow – A bow made of more than one material approximately 4 feet in length.
4. Recurve composite bow – An improved composite bow with inflexible ears made of bone.

Self bows are the oldest known type of bow and are found in the Paleolithic. They are simple to make and use. A typical self bow would have a pull of about 65 pounds.

Longbows are also simple to make and use. The earliest known longbow is from the Neolithic found in England dates from 2665 BC (Wikipedia).There are longbows of Egyptian manufacture found in the tombs of pharoahs. Native Americans also made and used longbows. European longbows, found in Denmark and northern Germany, date from between AD 100 and 350. These longbows were used in the late imperial Roman period, and at least on two occasions German archery repulsed a Roman attack. The first took place in 354, when the Romans were prevented from crossing the Rhine due to showers of arrows by the Alamanni, and then in 388 the Roman attack on Neuss was "repulsed by a a hail of arrows falling as thick as if thrown by arcubalistae" (Hardy, 2006).

There is strong evidence for the use of longbows after AD 350 and there was a strong tradition of archery in the Germanic areas of Europe. The Viking sagas exhibit a strong tradition of shooting and individual prowess with the bow. It is thought that Anglo-Saxon England did not have a strong tradition of archery. But the Anglo-Saxon word for throwing spear (onga) is the same as arrow (Hardy, 2006), which means that archery could be more prevalent in Anglo-Saxon battles than is previously believed.



The longbow is famous in the medieval period when it was used by the Welsh and English. A typical medieval longbow had a pull of 65 pounds. There were some that were greater but the vast majority was about 65 pounds. Most longbow staves were longer than 5 feet, usually 5.5 ft in the ancient period, and 6 ft in the medieval period.

Up until the 4th to 5th centuries AD, the Indian longbow was made from bamboo. Herodotus states that Indian arrows were made from reed and tipped with iron. Over time the Indian bamboo longbow is replaced by the composite bow. If the Indian longbow was so powerful, why give it up for a more expensive bow? The answer is obvious - the composite bow must be superior to the Indian bow.

An ancient and medieval composite bow normally is formed of a wood core with a backing of sinew and a belly of horn, all of this glued together using fish bladders (Wikipedia). The sinew backing permits the bow to be drawn through a greater arc than is possible for an unbacked bow, while the horn is very resistant to compression and thus acts as an additional energy storage device to augment the wood core. The net result is a bow which is smaller and lighter than a self-bow of the same draw weight and length.

The recurve bow is an improvement over the composite bow. The inflexible ears act as levers to help overcome the resistance of the bow. The string is accelerated by the bow during release and imparts a higher velocity to the arrow. This was confirmed by a History Channel episode in which the velocity of a longbow arrow and a composite bow arrow were measured by an electronic device. The arrows were released by the same archer using a 65-pound draw. The composite bow accelerated the arrow to 100 miles per hour, whereas the longbow arrow was clocked at 80 miles per hour at a distance of 30 paces. The recurve composite bow can store 57%

more energy than a 4-ft self bow and 30% more than the 6-foot longbow (Grieb, 1984) for the same 65-pound draw.

The Huns used composite bows and the construction techniques required several years to complete the bow. The Mongols and Turks also have similar lengths of construction times. The lamination of the different materials and the gluing process are the reasons for the lengthy construction period. Other composite bow users include the Egyptians, Skythians, Assyrians, and Sarmatians. Basically almost all mounted bow users were armed with composite bows.

Arrow lengths and weights

According to Sir Isaac Newton, the kinetic energy is equal to ½ mass times the velocity squared, and it is also equal to the energy of the arrow as it leaves the bow (Blanchard, 1983). Based on this one concludes that the lighter the arrow, the greater the velocity and it follows the greater amount of kinetic energy transferred to the arrow. However, the efficiency of the transfer of energy from the bow to the arrow is imperfect and with the lighter the arrow there is a loss of transferred energy.

Armor penetration by an arrow depends on the diameter of the arrow point, the mass of the arrow, and the velocity of the arrow at impact. The inefficient transfer of energy to the lighter arrow results in a loss of velocity and less potential armor penetration.

A significant difference between composite bow arrows and longbow arrows was the weight of the arrows used. Composite bowmen used lighter arrows than longbowmen. The diameter of the composite bow arrow was also larger than the longbow arrow. Both of these inferior characteristics resulted in less penetrating power for the composite bow. The remaining factor, that composite bow stores more energy than the longbow, lessens the negative effect of the lighter arrow (Grieb, 1984) and (Blanchard, 1983).

Humidity

The construction of a composite bow involves the layering of different materials to enhance the strength and flexibility of the staff. The layers are glued together. This glue works well in arid climates. However, Western Europe has a very humid climate. The glue tends to soften in humid climates. A composite bow is at a great disadvantage in humid climates and becomes useless (The History Channel). In contrast the longbow, being of one piece of wood, is superior to the composite bow in humid climates. I have not seen a set of rules that takes this important point into account. Mongols and Huns should be at a big disadvantage when fighting in humid climates in Western Europe, so much so that the bows are virtually useless.

Conditioning

Archery requires that an archer be fit and conditioned to draw an arrow through 65 pounds of force. This requires a great deal of practice. In addition the archer must be able to hit a target at varying ranges and velocities to be effective.

Modern bow hunters use longbows, compound bows, composite bows, and recurve bows. Competition archers also use similar bows. Most U.S. states and most nations require minimum draws on the bows for hunting, typically 40 pounds or more. I have interviewed hunting archers and typically they practice everyday using the actual hunting bow for an hour or more to maintain condition and accuracy. They prefer ranges of 20 to 40 yards to the target. Some competition archers shoot for distance, and others shoot for accuracy. But they, too, must practice daily to ensure condition and accuracy. Medieval English law required longbowmen to practice everyday including Sunday to maintain conditioning.

In many nations during the medieval period, peasants were levied to serve with bows. These peasants are less likely to be conditioned than professional archers. For this reason their battlefield effectiveness should be less. The draw of their bows was probably less as well, perhaps around 40 pounds.

Types of Bows Used by Nations

The Indian and Japanese longbows are not ‘real’ longbows in terms of their effect or use. Therefore, they should not be classified as longbows, but rather as bows on the wargames table (Blanchard, 1983). The early and later German tribes (including Saxons and Vikings) should certainly be classed as true longbows. Some Native American tribes are also longbow users (Wikipedia). Medieval Welsh and English longbowmen are obvious longbow users.

Composite bow users probably include Skythians, mounted Assyrians, New Kingdom Egyptian chariot riders, Hittites, Syrians, Parthians, Huns, Mongols, Magyars, and most other later steppes horse archers. Most mounted horse archers also are armed with composite bow.

Self bow users include most other ancient and medieval peoples, but also Indian and Japanese longbowmen.

Longbow users (foot archers) include:

New Kingdom Egyptians
Nubians
Ethiopians

Arabs
Medes
Persians
Kissians
Hyrkanians
Arians
Sarangians
Kurds
German tribes (including Saxons and Vikings)
Cherokee Indians
Medieval Welsh
Medieval English

Composite bow users (usually mounted, but also on foot) include:

Skythians
Saka
Mounted Assyrians
New Kingdom Egyptian chariot riders
Indian chariot and elephant riders
Assyrian chariot and horse archers
Chinese chariot and horse archers (Qin dynasty and forward)
Syrians
Sarmatians
Parthians
Huns
Mongols
Magyars
Pechenegs
Turks
Medieval Indians

Self bow users include:

Ancient Indians
Japanese
Caspians

Mounted versus Foot Bows

Another assumption made by many wargame rules authors is that the mounted bow has an inferior range to the foot bow based on training methods. Blanchard (1983) states that, “this is

rubbish." He agrees that accuracy is less for a less stable shooting platform, but the range should not be less because of training differences. He further quotes Arab and Turkish sources that the mounted training first took place on foot and then once that was mastered, it moved onto mounted training. This probably was true for all mounted archers throughout history.

Conclusions

All military bows normally draw 65 pounds with an exception for some. The difference between the various bows is the amount of energy stored, released, and transferred to the arrow. The composite bow's construction enables the archer to store an additional 25% energy over the longbow of similar draw. However, the composite bowman used a lighter arrow that reduces its armor penetration capability. The difference in armor penetration is only about 10% between the composite bow and long bow.

Also the conditioning of the archer is very important for the ability to pull a bow exceeding 60 pounds and to use the bow effectively in a battlefield situation. Militia and levied peasants with bows are less likely to be in condition to use their bows effectively on the battlefield.

Finally, longbows have been around for many thousands years in Western Europe and their use by Germanic peoples is well documented by Roman sources and archaeological finds. Therefore all Germanic archers should be given the classification of longbow. Anglo-Saxon and Viking use of the longbow is probable and army lists should be updated to reflect this.

And finally I have to admit that the Mongol composite bow is superior to the English longbow, but only by 10 per cent. But the mounted horse archer should take a negative modifier to simulate the unstable firing platform.

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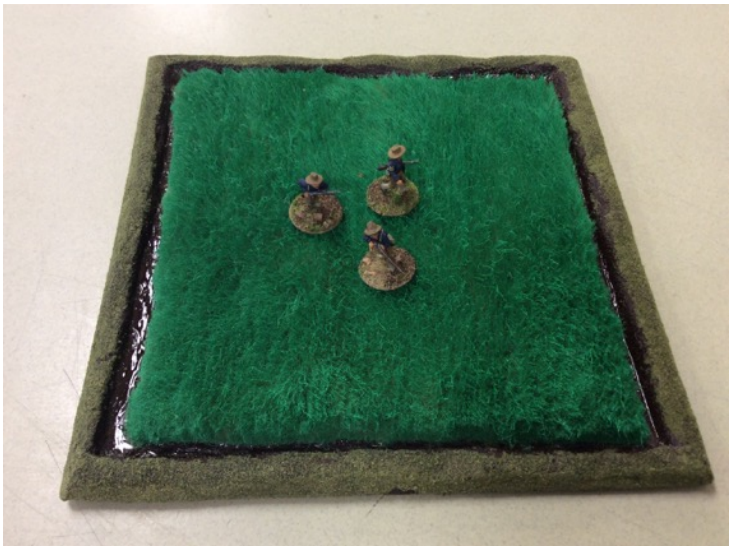
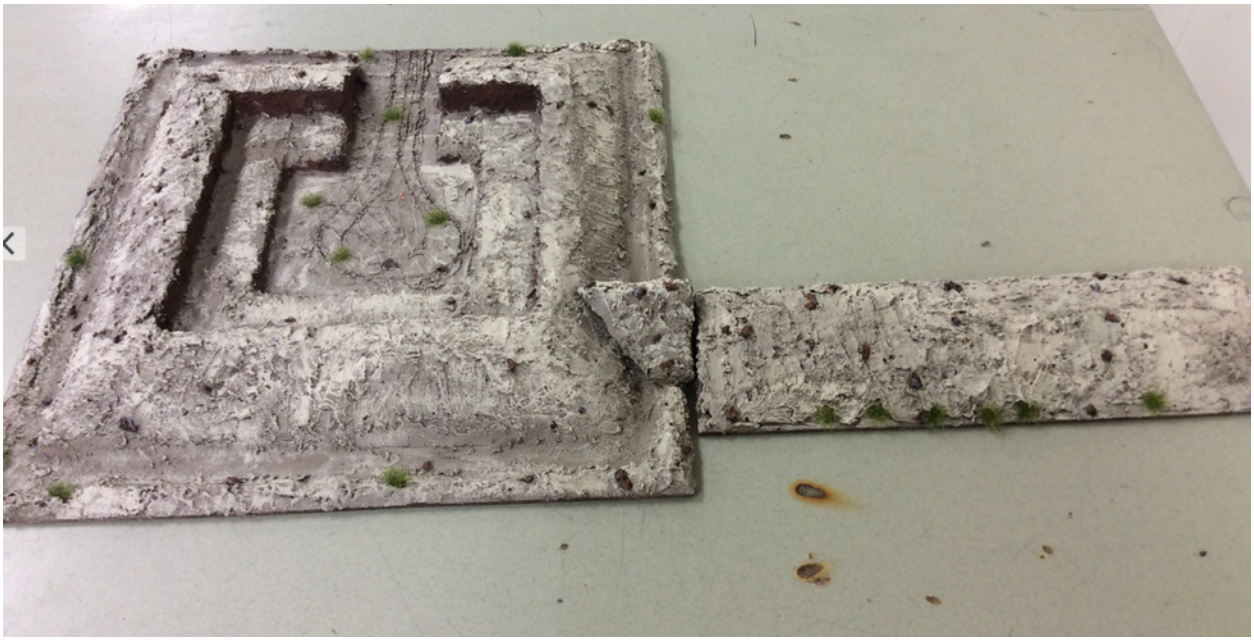
-, Longbow, http://en.wikipedia.org/wiki/Longbow

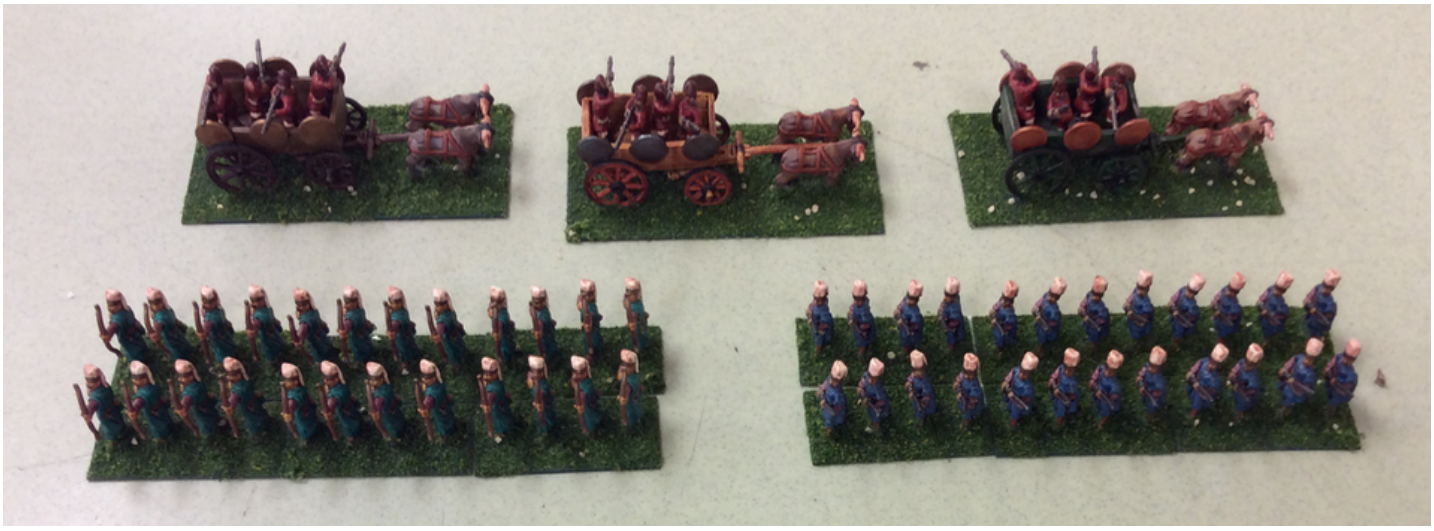
UNIT OF THE MONTH

(Not Sponsored)

Member Name	Scale	Manufacturer	Era	Unit
Eric Elder	28mm	Scratch built	Various	rice paddy
Jeff Lambert	15mm	Battlefront	WWII	DAK Artillery
Dave Manley	28mm	Home made	AWI	Bunker Hill Redoubt
Matt Vaigil	15mm	Essex	Ancients	Ottoman Janissaries
Matt Vigil	15 mm	Essex	Ancients	Ottoman War Wagon







GAME OF THE MONTH

Total Escape Games Sponsor

Member Name	Scale	Era	Rules	Description
Greg Cornell	20mm	WWII	Memoir '44	Unknown
Bill Daniel	15mm	WWII	What A Tanker	Bocage Two Step
Jeff Lambert	15mm	WWII	Flames of War 4	3rd Battle of Mareth
Dave Manley*	25/28	AWI	Black Powder	Bunker Hill

***Denotes this month's winner**

Each month CMH members host games at the monthly meeting. This award is for the effort put out by the host.

CMH DBxers Preparation for the annual CMH-CSGA Smackdown

CMH July Scheduled Events

This table shows what events are scheduled for CMH. Next months Friday Night Fights (FNF) and the monthly meeting (MM) are listed. It is recommended to schedule your game for future meetings and will appear on this page.

Date	Meeting	Location	Start Time
July 6	FNF	TEG	7PM
July 8	MM	Baker Rec Center	12-5PM
July 13	FNF	TBD	7PM
July 20	FNF	TBD	7PM
July 27	FNF	TBD	7PM

TEG - Total Escape Games
6831 W. 120th Ave.
Suite C
Broomfield CO 80020 **www.totalescapegames.com**

FNF (TBD) may or may not occur due to a lack of a scheduled host/location.

COMING EVENTS:

July 8: CMH-CSGA Smackdown 2018 GO TEAM!
July 12-15 Historicon Lancaster PA

Colorado Military Historians, Inc.

Colorado military Historians (CMH) is a non-profit organization whose purpose is to promote historical wargaming and the study of military history. Founded in 1965, CMH meets monthly on the second Sunday of the month, except in May when it is deferred to the third Sunday. The meeting starts at noon at the Baker Recreational Center, 6751 Irving Street (just a few blocks west of Federal Blvd), Denver CO. The club also hosts gaming at least one Friday night a month, called "Friday Night Fights" (FNF) at 7 PM. FNF will be held at several various locations. See previous schedule or view the website for latest information.

CMH maintains ties with numbers local, regional and national groups to help promote the hobby. CMH is governed by member-elected officers who serve on the Board of Directors (executive board). Terms are one year, with elections held at the May meeting. New members are accepted after attending three CMH functions and a vote of the membership. Dues are $45.00 per year, payable in January. Members wishing to receive a snail-mail newsletter subscription must pay an additional fee of $15.00 per year. Authors retain ownership of articles and graphics published. CMH reserves the right to edit or reject submissions to the newsletter.

One year Adult Membership: $45.00
Half year Adult Membership: $30.00
(For NEW members who join after June 30)
Family Membership: $45.00 (one Adult and any number of offspring)
Student Membership: $25.00 (16 to 22 years old)

CMH Newsletter

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