


# SHOOTING THE PAST: COLONIAL & REVOLUTIONARY WAR FIREARM LIVE FIRE EXPERIMENTS & SPHERICAL BALL PERFORMANCE.

By Joel Bohy

During the Parker's Revenge Archaeology Project at Minute Man National Historical Park in 2016, archaeologist Dr. Douglas Scott, well known for his work at The Little Big Horn and other historic battlefields, mentioned how we were finding great examples of fired Provincial and British ball to put the historical study in context, but wouldn't it be great to do a live fire study of flintlock firearms used during the Revolutionary War to really expand our knowledge of how these guns actually functioned and try to acquire data that might not only help conflict archaeologists, but also those who study and own the original flintlock firearms? I also felt that it could broaden our understanding of important historic events and how they transpired. fifteen years previous, I had begun collecting custom-built examples of these firearms to shoot live. We then had the tools to make the study happen. Since this was self-funded, we needed to raise some money. The Modern Heritage Foundation gave us a grant which enabled us to hire a ballistics specialist, Nathan Boor from Aimed Research. He would bring hi-speed cameras and the computer equipment necessary for us to capture the scientific data. The rest of the study would be paid for by us.

Prior to our testing we studied original paper cartridges to get the correct range of laid paper weights for our loads. We also found the correct weight linen cord to tie them off. Ball in a variety of calibers was purchased (Figure 1), ballistics gelatin, as well as making up cloth samples to simulate civilian and military clothing of the period was obtained. The cloth used was custom reproduced in England to 18th century specifications, as were the linings and Irish linen for the shirting. As propellant, we studied a variety of available modern black powder and decided that Swiss brand in FF grain size would be our standard. A range safety officer was designated and dates were set.


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In November 2016, we met at a private property just south of Atlanta, Georgia, to commence the study. For the first phase of the project, we had a target setup at 100 yards (although determining accuracy was not our initial goal) for an aiming point, and the camera equipment was setup to capture muzzle velocity. A wooden palisade made from a variety of wood species was built as a backstop as well as a dirt berm. We narrowed down the analysis to seven guns, a British Royal Artillery carbine, British Pattern 1742 and 1756 long land, a French Pattern 1728/41 musket, a French Pattern 1768 musket, a Potsdam Model 1740 musket, and a Thomas Earle Worcester County-style fowler (Figure 2). The two British long land pattern muskets were a bit redundant as the shape of the lock and stock would not make a difference in ballistics but we were having some issues with the 1756. After firing each round, the range was cleared and a recovery team metal detected to find the fired ball, which was then bagged, numbered, and recorded for later study.

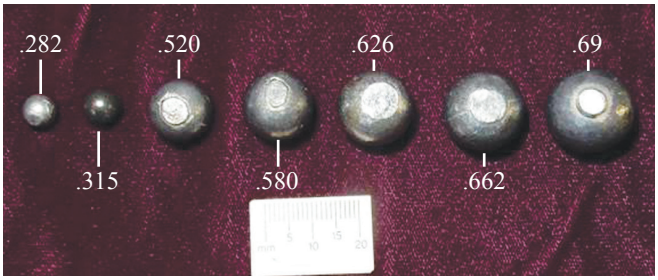


Figure 1. Cast lead balls, .282, .315, .520, .580, .626, .662, and .69 caliber.

Figure 2. Bill Rose and Dr. Douglas Scott reviewing the bore diameters before loading.

The second phase of the study was to fire into ballistics gelatin at 25 yards with cloth samples of a variety of types on the face, collect the ball, and see what data that could give (Figure 3). Previously on Revolutionary War conflict archaeology sites, ball had been found with a cloth imprint that some believed was from patching. The deformation of that ball was on the face where they struck the target and under magnification, powder burn and stippling could be seen on the opposite side of the ball which meant that there had been no patch behind it so the cloth weave on the struck face of the ball had to have come from initially hitting a cloth target. This was also tested by not using a paper cartridge and using a cloth patch when firing the ball. The results of the cloth patch while shooting into the gelatin showed plain woven broadcloth on the struck face as well as some light deformation (Figure 4), no patch weave and no powder burn/stippling on the back as the patch had taken the brunt of the powder ignition. Either way we fired, the weave of the cloth that was initially struck by the ball was clearly visible and when fired at a finer woven cloth, the difference in weave was clearly visible. This meant that the type of cloth the ball struck could be determined by the imprint on the ball.

We also learned some data about accuracy, although again, that was not the initial goal of the study. The Worcester County-style fowler was the first gun fired. We did ten shots per gun but switched shooters after five rounds. The fowler was determined to be the most accurate weapon of the group. At 100 yards every shot hit the target. It also had the highest muzzle velocity of them all averaging at about 1300 f/s. The Potsdam Pattern 1740 was the worst with very few ball recoveries and an average muzzle velocity of 700 f/s.

While we covered more ground with this study than expected there are many more questions to be answered with live fire of historic arms. This past November, we continued with another week of study that gave us some new and important data on flintlock firearms as well as some percussion. Hopefully this will be published in the near future.

Figure 3. Bill Rose firing the Thomas Earle fowler at cloth-covered ballistics gelatin.

So why was this study important? We were able to use the data from the recovered ball to form a deformation index for use by conflict archaeologists. They can use the index to come up with a likely muzzle velocity as well as the distance from the muzzle of the gun that fired the ball. At the Fields of Conflict Archaeology Conference this past fall, I saw many papers and posters that had used our work to help tell the story of the battles they had been studying. Soon after we completed the first week of work, we were asked by the National Park Service Northeast Region Archaeology Program to volunteer on a metallic survey of sample areas at Little Round Top in Gettysburg prior to a controlled vegetation removal burn they were going to do. While surveying an area where a temporary mass grave had been, we recovered a few interesting balls. Two had been chewed out of bodies by hogs, but one had a cloth imprint on it that we could match up based upon the ballistics study to a twill woven cloth, possibly a fatigue blouse or kersey trousers. This makes all of the time and expense worthwhile to see

Figure 4. Ball with a plain woven cloth imprint retrieved from the ballistics gelatin.

our study used in this manner and hopefully our future firearms studies will yield other data that might prove invaluable to archaeologists, historians, and gun collectors alike.

To learn more about this study see the following report on the project:

Scott, D.D., Bohy, J., Boor, N., Haecker, C., Rose, W. Severts, P. 2017. Colonial era firearm bullet performance: a live fire experimental study for archaeological interpretation. Found at:

http://modernheritage.net/research.html