Myths of the Blunderbuss

Melvin Flanagan

One of my favorite authors wrote an article in the February 1955 issue of The American Rifleman, titled "Did It Work?" The article was a report of a study sponsored by the National Rifle Association pertaining to the blunderbuss *" . . . to try once and for all to present an accurate picture of this interesting weapon, its purpose, its history, and its actual performance."* Harold Peterson later used the facts and data that were in this study in other publications, reinforcing the conclusions he made, giving credit to the National Rifle Association for the information, and not revealing that he was a participant in the development of the information.[1]

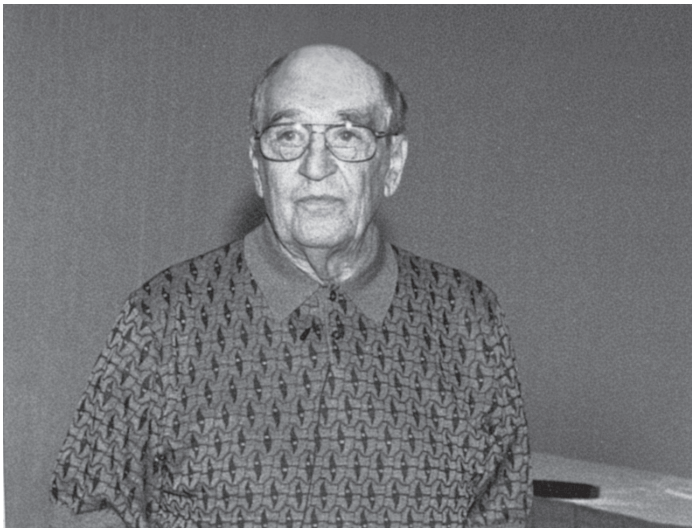
The information reported in this study has been considered reliable and is used as a reference by a number of authors when describing the blunderbuss' history and performance as a weapon.[2]

Wikipedia, the free encyclopedia, added to the blunderbuss' description: "The National Rifle Association carried out some experiments with antique blunderbusses in the 1960s and discovered that the flared barrel had no effect on the spread of shot; shot did spread as in any other shotgun, but not to the same extent" in December, 2006. For a short time in May 2007 the Wikipedia description of the blunderbusses included this: " . . . discharges lead shot, porcupines, forks, knives, and small mice upon firing." This part of the description was edited out within a few hours.

For many years I have questioned some of the interpretations that were made of facts that pertained to blunderbusses and the evaluation made about the performance (spread of shot) produced by blunderbusses that was reported in the article "Did It Work?" Is the information in the article accurate or were there myths created in the article? Most of the facts in the article which I have doubts about can be resolved by research. To evaluate the actual performance of blunderbusses as it pertains to the spread of shot will require another test firing.

The first questionable item concerns whether or not the Pilgrims could possibly have used the blunderbuss. Is it fact or myth? The article first states: *"The blunderbuss, in fact, has become a part of our national heritage. Every school boy is familiar with the standard pictures of a Pilgrim Father with a Bible, a bland smile, and a blunderbuss with the muzzle belled out like a trombone.*

The article later explains that,*"It* (the blunderbuss) *appears to have been developed on the Continent and was introduced in England from there about the middle of the 17th century." " . . . it had not even been developed in time for use by the Pilgrims."*



There is important information that was overlooked in the study pertaining to the time period, the country or countries where the blunderbuss was developed, and where a large number of Pilgrims lived prior to immigrating to America.

Figure 1. Thanksgiving, Pilgrims, Church, Bible, and Blunderbuss (1920)

Figure 2. Thanksgiving, Pilgrims, Church, Bible, and Blunderbuss (1909)

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1911

Figure 3.

1917

Figure 4.

Figure 5. Marilyn Monroe commemorating Thanksgiving 1950

The blunderbuss was developed during the 16th century, probably in Germany.[3] One historian, J. Alm, believed the origin to be Holland, however he does not mention any facts to defend this theory.[4] Leonhardt Fronsberger's book on military matters, *Von Kayserlichem Kriegsrechten*, published in Frankfurt, Germany in 1556 describes a short-barrel smooth-bore gun shooting 12 or 15 bullets of musket bore, comparable to the charge of a blunderbuss. These weapons were used by troops during the assault when the weapons' scattering effect was considered extremely advantageous.[5]

From Germany the blunderbuss principle appears to have spread to Holland. A matchlock blunderbuss, traditionally thought to have been used in battle on the Zuiderzee in 1573, probably dates c. 1600 and is in the Westfries museum at Hoorn, no. K 31.[6] A patent was granted to a Henrick Theilmans of Echten on October 26, 1598 for a type of gun called a "Donderbus" that could be used on both land and sea and could shoot a pound of shot approximately 500 paces.[7] The blunderbuss was used in Holland for over two decades before Pilgrims sailed to America.

A substantial number of the Pilgrims who sailed to America in 1620 from England had emigrated to Holland in 1607 because of religious persecution. They lived first in Amsterdam for a short period of time. The Pilgrims then moved to Leiden, a university city. In Leiden, their leaders found a stimulating and theological atmosphere, while many of the refugees found jobs as textile workers. The Pilgrims left Holland in 1620 to keep their children from losing their English identity and to shield them from ungodly influences.[8] They could have been aware of the blunderbuss and may have wanted this type of weapon for their defense. The claim that it was not developed in time for use by the Pilgrims made in "Did It Work?" is not accurate—it is a myth. I do not believe it is possible to determine, whether blunderbusses were used by Pilgrims (using the information that is now available).

Another questionable fact regarding the blunderbuss that originated in "Did It Work?" relates to the size and shape of the shot patterns produced by blunderbusses. It was stated that, *"Even after he has become a collector and student of old weapons, this individual will probably continue to believe that the spread of shot from a blunderbuss is directly related to the shape and flare of the muzzle."*

Because of the lack of information on the performance of the blunderbusses, either contemporary or recent, a series of tests was made to determine the spread of shot of a blunderbuss.

The series of tests were performed by H. L. Peterson with the aid of the National Rifle Association Technical Staff member C. Meade Patterson (a well-informed writer) and Herb Glass of Bullville, New York (a well-known shooter, collector and dealer), who provided the guns from his personal collection and fired most of the test shots.

There were three long blunderbusses used in the study "Did It Work?" They were selected for condition and to give as wide a range as possible in barrel length, length of flare (barrel length between forward end of cylinder bore and the muzzle end of flare), and amount of flare (difference between diameter of bore at breech and diameter of flared mouth).

The first gun chosen had an iron barrel 25-3/4 inches long with a caliber of about .60 inch at the breech and a muzzle diameter of two inches. The flare began 11 inches from the muzzle.

The second gun was a brass-barreled gun marked "Nock." It had a barrel 23-7/8 inches long with a caliber of about .69 inches at the breech and a muzzle diameter of 1-1/4 inches. The flare began 4 inches from the muzzle.

The third blunderbuss was marked "Oakes." This piece had a 18-1/8 inch long iron barrel with a caliber of about .75 inch at the breech and a muzzle diameter of 1-1/8 inches. The flare began 6-1/2 inches from the muzzle.

In addition to the long blunderbusses that formed the basis of the test, a pair of Spanish brass-barreled blunderbuss

pistols were fired for additional information. These guns had barrels 6-7/8 long with a caliber of .60 inch at the breech and a muzzle diameter of two inches. The flare began 4-1/2 inches from the muzzle.

The article states, *"In a blunderbuss, the breech caliber is the critical one. It determines the space where the powder and balls are confined. Despite the flare of the muzzle, the breech calibers of most blunderbusses are roughly comparable with contemporary muskets. Most .67 caliber muskets of the period, when firing buckshot loads used about 12 balls with powder charges of 120 grains. Muskets of .75 caliber fired slightly bigger charges, usually 15 balls and 130 0r 140 grains of powder."* A critical element of the shot charge, the total weight of the buckshot, and the caliber of the buckshot was not taken into account.

Identical loads were chosen, to be used in all of the shoulder arms tested, 15 No. 0 (.32 caliber) buckshot (1.66 ounces) and 3-1/2 drams (96 grains) of DuPont FFG blackpowder. The proportion of gunpowder to buckshot weight is 13%. The .75 caliber Oakes also was tested with both 3-1/2 drams (96 grains) and four drams (110 grains) of powder. The proportion of gunpowder for the four dram powder charge to buckshot weight is 15%.

The .60 caliber pistols were loaded with 18 No. 0 buckshot (2 ounces) and two drams (55 grains) of powder. The proportion of gunpowder to buckshot is 6%. "*This somewhat disproportionate load was required because the thinness of the breech prevented use of a larger powder charge while the rapidly increasing bore diameter made a smaller number of shot ineffectual."*

During the testing, each shoulder gun was fired several times from distances of 40 and 60 feet. After each shot, the locations of all shots were recorded on separate sheets bearing sketches of the target group.

The article states that, *"The tests were surprisingly uniform. At 40 feet each gun produced targets with a lateral spread averaging between 20 and 36 inches. The Oakes . . . produced one target with a lateral spread of 60 inches. At 60 feet, the Oakes averaged a lateral spread of 50 inches, which was slightly bigger than the records of the other two with larger bells."*

"The pistol proved to be the most disappointing weapon. The barrel flared so sharply that it was necessary to put in a large number of balls to keep from having them lie only on the bottom of the barrel. At the same time the breech was not strong enough to take a heavy charge of powder. This combination of a fairly light charge and a heavy load of shot produced a tremendous kick."

The pistols were tested at 15 and 25 feet. The balls entered the Homosote (a fiberboard similar to Celotex) at low velocity and tore great holes in the back as they emerged. At 35 feet they failed to penetrate. It was reported that "*The spread was tremendous, 40 inches at 25 feet."* The spread for the 15 and 35 feet tests was not reported.

Peterson's evaluation of the shot patterns was, *"In view of these tests, it seems safe to state that the bell of the blunderbuss had very little effect on the dispersion of the shot. It quite possibly was useful when loading a handful of small balls in action or on a moving coach; and it may have had a tremendous psychological effect on those who found one pointing their way, but that was about all."*

It was declared in the article that the lateral spread of shot made by the blunderbuss pistols at 25 feet was "*tremendous."* Webster's *New Collegiate Dictionary* definitions for the word tremendous are: astonishing by reason of extreme size, power, greatness, or excellence; unusually large; huge.

Yet it is stated that the bell (flaring bore) of the blunderbuss had very little effect on the dispersion of the shot. There is nothing in the article that reveals what other guns without a bell (flared bore) dispersion of shot would be.

What facts were reported in the article that would support the appraisal made concerning the dispersion of shot made by blunderbusses?

The proper procedures for measuring the patterns made by a shotgun were not followed. Only the lateral spread of the shot charge was measured in the tests instead of the diameter of the whole shot charge (known as the killing circle) that is the customary way that shot patterns are measured. Therefore, I decided to conduct my own tests to determine whether the blunderbuss form of flaring barrel had a larger shot pattern than a firearm that has a conventional (cylinder bore) barrel.

New made-to-order blunderbuss barrels were purchased for this study because it was not possible to obtain antique blunderbusses that would safely fire the large quantity of gunpowder and shot that were often used in these firearms. An antique blunderbuss would require reproofing before using, which could possibly destroy the barrel. Baker recommended in *Baker's Remarks on The Rifle* that this be done. A chapter in this book on rifles is titled "Bursting of Blunderbusses." According to Baker's, the reason for this chapter is *"because of the great number of accidents arising from the bursting of blunderbusses."*[9]

When testing, all variables such as breech bore size, barrel length, muzzle opening area, etc., should be similar. The only variable among the blunderbusses would be the barrels' bore interior shape. This would demonstrate that the difference (if any) in size of the shot patterns made by the blunderbuss barrels could only be related to the barrels interior shape, not to different bore sizes or barrel lengths.

There can be considerable difference in size of shot patterns made with light charges of gunpowder compared to

those made with heavy charges of gun powder and shot. The largest spread of shot is obtained by using high velocity loads, creating greater pellet deformation.[10] To explore the effect of heavy charges the barrels must be strongly made with thick walls, specifically at the breech area.

Four blunderbusses would be needed to evaluate the different types of barrels used. The preferred length of the barrels is about twenty inches. One barrel would have to be made with an oval shaped muzzle, to determine what, if any, effect this muzzle shape would have on the shot pattern. Another barrel used would have the bore starting to increase in size about four or five inches from the breech. An additional one would have the increase in bore size starting about mid-length. The last barrel would need to have the flare start about four or five inches from the muzzle. The muzzle openings of the blunderbusses including the oval shaped muzzle should be at least 150 percent of the breech bore diameter.

One firearm with a cylinder bore barrel is needed, to compare the blunderbuss' shot patterns to the shot patterns made with this type of firearm. The cylinder bore gun barrels' bore and length should be the same as the blunderbusses.

After a long search, I was fortunate to find a knowledgeable barrel maker that could make some of the barrels and would take the time and effort required to manufacture the required barrels. The barrel maker, Ed Rayl of Gassaway, West Virginia could supply barrels with the bore starting to flare about mid-length. They would have to be made in 4-gauge (1.05 caliber) in order to accomplish this length of flare in a twenty inch long barrel. An oval muzzle could not be machined; it would have to be made by heating and shaping one of the round muzzles into an oval shape. The longer, almost full-length flared bore, could not be made by Ed Rayl. The 4-gauge bore barrels are larger than was sought, but they sufficed. The recoil of this size of gun is very large and would be uncomfortable to shoot from the shoulder, especially when heavily charged. A gun carriage that would absorb the recoil was made to support them when they were fired.

Four barrels were purchased in 2004. All are 4-gauge at the breech with 19.2-inch interior bore lengths. One is a cylinder bore, to be used as the standard in evaluating the effect a flared bore has on shot dispersion. Two have mid-length flared barrels, with the flare starting 9.5 inches from muzzle. One of these had the muzzle shape changed from round to oval. Another has the flare starting 4.5 inches from the muzzle. All the flared barrels have 1.75-inch muzzle openings. The barrel with the muzzle opening reshaped to oval now has a muzzle opening 2.5 inches wide by 1.6 inches high. A 5-inch long breech plug is utilized in securing the barrels for firing. The barrels are not finished on the outside as is normally done. This was done so that their weight would be as heavy as possible to help in controlling the recoil and to permit experimenting with heavy charges of powder and shot with a very large safety factor.

A local gunsmith, John Kelly from Parker, CO later suggested in the spring of 2005 that it might be possible to use a tapered reamer to extend the tapered section of a Ed Rayl blunderbuss barrel so that it would have the desired almost full-length flared bore. In the late spring of 2005, one more mid-length barrel was purchased to be modified into a longer flared bore by using a tapered reamer. A 10-gauge blunderbuss barrel was also purchased with the flare starting 4.8 inches from the muzzle. It was to be used for comparing with patterns of the larger 4-gauge with a similar shorter length of flare.

To keep the costs of this study reasonable, ignition was by fuse. This also duplicated the open vent hole of a matchlock, wheellock or flintlock firearm.

Determining the proper loads for the 4-gauge blunderbuss barrels was researched, with only one reference found. Other references were found that had information for buckshot loads for muskets. One other reference related to heavy charges in blunderbusses.

George, in English Guns & Rifles, states that blunderbusses were strongly reinforced at the breech to allow for the use of a heavy powder charge. A 4-gauge charge was not *less* than 12 drams of powder and a quarter of a pound of swan-drops.[11] Swan-drops are described as being 15 pellets per ounce, 240 per pound (.27 caliber, No. 2 buckshot). The gunpowder to projectile weight for this charge is 19 percent.

Figure 6. Test barrels.

INFORMATION ON BLUNDERBUSS BARRELS USED IN TEST						
MEASUREMENTS IN INCHES	BARREL NUMBER					
MEASURED AT	1	2	3	4	5*	6
EXTERIOR BARREL TUBE LENGTH	20.0	20.0	20.0	20.0	20.0	20.0
INTERIOR BORE LENGTH	19.2	19.2	19.2	19.2	19.2	19.2
BORE AT BREECH	1.05	1.05	1.05	1.05	1.05	.775
BORE TAPERS FROM BREECH	9.6	14.5	N.A.	9.6	4.8	14.4
BORE TAPERS FROM MUZZLE	9.6	4.7	N.A.	9.6	14.4	4.8
BORE DIAMETER MID-LENGTH	1.05	1.05	1.05	1.05	1.15	.775
BORE 3/4TH LENGTH FROM BREECH	1.38	1.05	1.05	1.4x1.2	1.50	.85
BORE MEASUREMENT AT MUZZLE	1.75	1.75	1.05	2.2x1.3	1.85	1.52
WEIGHT IN POUNDS	10.9	12.0	12.6	10.8	10.8	14.6
* After bore was modified by taper reamer.						

Figure 7. Barrel Information

An 1896 table that shows the service loads for various calibers of muzzle-loading guns describes the powder charge for a 4-gauge gun as 10 drams and the ball and shot weight as 3-1/2 ounces.[12] The gunpowder to shot ratio for this load is 18 percent.

Another source that describes the powder charge was found and included information that permits the buckshot load to be determined for the total weight in grains, and number and caliber of the buckshot pellets.[13]

A paper buckshot cartridge for a 1780 Brown Bess .75 caliber musket contains 9 buckshot (.32 caliber) weighing 428 grains (slightly less than one ounce) and 164 grains of powder; 10 or 12 grains of the powder is used for priming. The proportion of gunpowder to buckshot by weight is 35%.

A paper buckshot cartridge for a U.S. Model 1808 .69 caliber musket contains 15 buckshot (180/lb, slightly smaller than .30 caliber), weighs 583 grains, and has a powder charge of 160 grains that includes 10 grains for priming. The proportion of gunpowder to buckshot by weight is 26%.

A paper buckshot cartridge for a U.S. Model 1822, 1840 .69 caliber musket contains 12 buckshot (170/lb, .30 caliber) that weighs 494 grains with 130 grains of powder that includes 10 grains for priming. The proportion of gunpowder to buckshot weight is 24%.

A paper buckshot cartridge for a Model 1840 .69 caliber Flintlock Musketoon contains 12 buckshot (170/lb, .30 caliber) that weighs 494 grains and has 85 grains of powder. The proportion of gunpowder to buckshot weight is 17%.

Another reference, *Narrative of a Five Year's Expedition,* by John Gabriel Stedman does not have any information on the quantities of powder and shot used. This information is relevant because it describes what precautions should be taken when a heavily charged blunderbuss is fired.[14]

Captain J. G. Stedman, an officer in the Scots Brigade in the service of the General States of the Dutch Republic, volunteered for service against the revolted Negroes of Surinam in Guiana on the wild coast of South America. He served there from 1773 to 1778.

Stedman was dispatched for river patrol on July 1, 1773 with a crew of soldiers in barges armed with swivels and blunderbusses. They were provided with supplies for one month. Their orders were to cruise the upper parts of the rivers Rio Cottica and Patamaca, to prevent the rebels from crossing the rivers. They were to seize or kill them if possible and protect the estates from invasions.

On July 8, 1773, Captain Stedman and another Officer who patrolled another area of the rivers, Captain Orzinga met and agreed to see if sound of gunfire could be used to signal for help:

"The 23rd being the day appointed by Captain Orzinga and myself for the trial of the signals, at twelve o'clock precisely the whole number of blunderbusses and swivels were fired at Devil's Harwar on board the Charon, and on board the Cerberus, still stationed at Patamaca; which proved to be of no purpose, no person on board either of the vessels having been able to hear the reports fired by the other. During this, however, I met with a small accident, by firing myself one of the blunderbusses, which I placed like a musquet against my shoulder; when I received such a stroke by its rebounding, as threw me backward over a large hogshead of beef, and had nearly dislocated my right arm. This however it seems was owing to my ignorance of the manner of using the blunderbuss, as I have since been informed that all such weapons ought to be fired under the hand, especially when heavily charged; and then by swinging round the body suddenly, the force of the rebound is broken, and the effect scarcely sensible. I insert this only to shew [sic] in what manner the heavily-loaded muscatoons [sic] ought always to be fired; especially since, without any aim, the execution from their wide mouth is always equally fatal."

Note that both blunderbusses and musketoons were used by Stedman to describe the same weapon. Using the word musketoon to describe a blunderbuss is common, creating confusion for collectors.

Other information relevant to loads for blunderbusses that relates to Stedman's experience in firing a blunderbuss was found. The size of the of the charge of powder and shot has a relationship with the weight of the gun firing the charges (assuming that the barrel is capable of firing the charge). If the charge is too large for the weight of the gun it creates excessive recoil.

Hawker, in *Instructions To Young Sportsmen*,[15] explains it very well. A charge of one- and a half-drachms (90 grains) of powder, exclusive of the priming, to an ounce and a half of shot (656 grains) is suitable for a six-pound gun. The proportion for a twelve-pound gun is to be doubled, eighteen-pounds trebled, twenty-four pounds quadrupled, etc. Much more may be fired, but not with ease to the shoulder. The proportion of gunpowder to shot weight is 14%.

Shot patterns are influenced by many things that include: pellet velocity, hardness of the pellet, shape of the pellet, type and quantity of wadding, and amount and type of gunpowder. The spherical shape of pellets gives them poor ballistics even when undamaged. Heat, friction, and abrasion damage the pellets that come in contact with the bore. Pellets also bounce off of each other, causing additional damage.

Setback force (the rapid acceleration following ignition) causes distortion of the pellets. The damaged pellets usually fly off, increasing the size of the pattern. The air resistance on the damaged pellets acts in an uneven manner causing them to gyrate and twist from the string. Lower velocity

causes less damage to the pellets, therefore more pellets will stay in the pattern. Besides velocity, the use of lead that is hard can reduce the pellet deformation. The trip down the bore can be harmful to the pellets in turn, creating a larger pattern. One method of spreading the pellets is to use the softest pellets available at the highest velocity. This will spread the shot because the air resistance causes the deformed pellets to gyrate and twist, producing a larger pattern.[16]

There are two wadding materials that were usually used during the blunderbuss era—paper and tow. An order dated April 6, 1779 directed Massachusetts soldiers to report with all of the articles that included tow for wadding indicated in the instructions.[17] Tow was selected to be used for wadding in the testing of spread of shot.

As I had never done any muzzle-loaded shooting, there was a great deal I had to learn. Four friends, George Moller, Jack Brooks, Lloyd Gebow, and Bill Rutherford, all members of Colorado Gun Collectors Association, had done a lot of this type of shooting. Their help was valuable and appreciated.

Another good friend, Billy Stapleton, who is a collector of double-barrel shotguns, the present president of CGCA, and who is proficient in patterning shotguns, offered his help and located a site for the patterning tests. He has assisted at many of the test sessions and helped in the research and found valuable information in his library that was used in the test program.

Testing is being done at the Golden Gun Club Range at Watkins, Colorado. There are concrete-top tables with heavy pipe legs that are used for bench rest shooting at the rifle range. This area was designated to be used for the blunderbuss barrel testing.

The author designed and made a gun carriage made mostly of laminated oak suitable for holding the barrels for firing, which utilizes the bench rest table's construction and weight in controlling recoil. Sixteen compression springs are used for control when a barrel is fired. The device is set on a rubber mat in contact with the front edge of the table, free to move from the recoil.

The targets that have been used for patterning are either a four foot by four foot sheet of paper or 2 NRA B-27 Silhouette targets mounted side-by-side, backed up by cardboard attached to a light wooden frame. The targets are suspended from a large U-shaped sturdy wooden frame by two straps at the top. Two bungee cords attached to the bottom of the target prevent the target from swinging because of wind. It would be extremely difficult to use a larger target

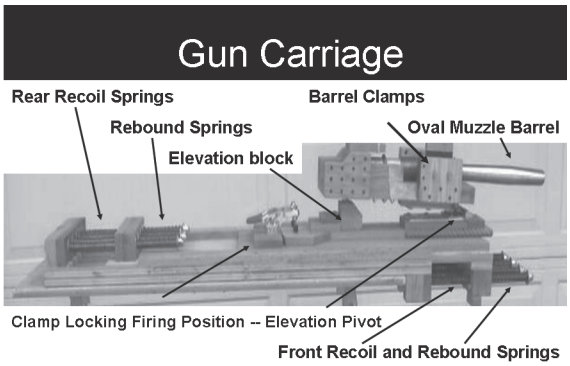
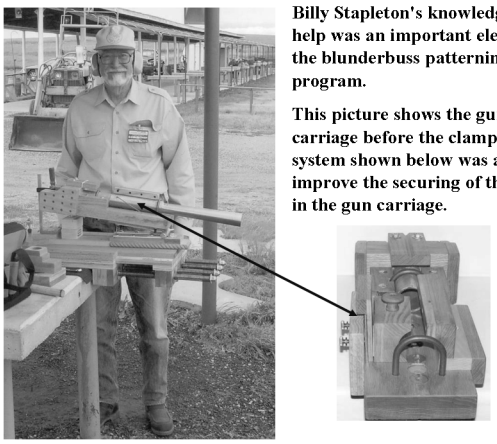


Figure 9. Gun carriage.

Billy Stapleton and Bill Pitman loading a barrel, Golden Gun Clubs' rules require that guns are placed in gun racks and range is closed for shooting while targets are changed.

Figure 10.



Billy Stapleton's knowledge and help was an important element in the blunderbuss patterning test program.

This picture shows the gun carriage before the clamping system shown below was added to improve the securing of the barrel in the gun carriage.

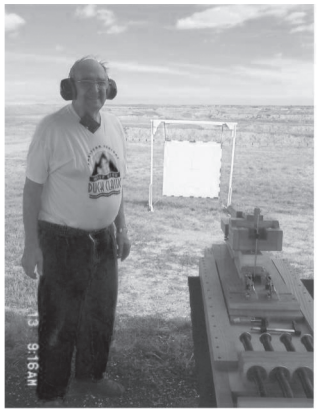
Figure 8. Billy Stapleton at range.

Three grandsons, from left to right, Andy and Thomas Streeter, and Tyler Flanagan were my helpers in 2006 during many of the test sessions. They did most of the hard work; I just loaded the barrel with the powder and shot charges. They enjoyed lighting the fuse, the explosion sounded like a giant firecracker to them.

Figure 11. Flanagan helpers.

than this because of the prevailing winds at this location. Usually about six tests are completed in one testing session.

All of the tests have been made at 10 yards. The normal blunderbuss range is said to be ten to twenty paces (25 to 50 feet). Testing at this short range is thought to be the appropriate distance because of the large size of the blunderbuss shot patterns. Often a large number of the holes made by buckshot pellets striking the target cannot be detected, either because the shot pattern struck the target off-center, two buckshot pellets made only one hole, or because the pattern was larger than the four-foot-square target could accommodate. Firing at longer distances would result in a greater number of shot landing off target when using blunderbuss barrels. The cylinder bore barrel used for comparison purposes has produced much smaller shot patterns. All pellets have landed on the target and are accounted for.



Target is suspended by straps at the top and secured by bungee cords at the bottom.

Figure 12. Target. Pictured is the author, Mel Flanagan.

Each target's shot pattern was measured for width, height, and the diameter of the total shot pattern visible on the target. This information is often misleading, because the measurements recorded are smaller than what actually took place because all of the shot pellets did not hit the four-foot-square target.

An acrylic flat ring 5-inches wide with a 30-inch circular diameter and a 20-inch inside diameter, similar to that shown in *The Mysteries of Shotgun Patterns*, was obtained.[18] It is manipulated over the patterned target so that the area that has the greatest number of pellet holes in a 20-inch diameter circle is located. The number of pellets in both the 20- and 30-inch diameter circles were counted and recorded. Later, the 30-inch ring was divided and marked in ten equal segments and a 20-inch diameter disk was divided and marked in four pie shaped segments to aid in counting pellet holes in the target.

The paper targets were removed from the back-up frames after the shot patterns were measured and recorded, and new paper targets were installed for the next shooting session.

The testing of the barrels began August 23, 2004 and continued until October 26, 2004 (tests 1 through 43). This time was spent sighting in the barrels and trying different charges of gunpowder and shot. Evaluation of different types and sizes of shot was done, with cast shot made in different sizes using antique and modern molds and certified 99.97 percent pure lead. Hornady cold swaged buckshot made with a lead alloy hardened with antimony to prevent deformities after firing was tested. Numbers 0, 1, and 3 were used in a few loads during the sighting in period.

After the last test session in October, the weather that followed was not suitable for additional testing. The test results were reviewed and we found the cylinder bore barrel patterns were more consistent than the blunderbusses, 18 to 21 inches in diameter. The blunderbusses' patterns varied from extremely small to large patterns, one was even smaller than those that of the cylinder bore barrel made, 8 inches in diameter. The other blunderbuss shot patterns varied from 29 inches to 38 inches in diameter.

It became apparent that the quantities of tow wadding being used had a very large influence on the shot patterns. Various quantities of tow wadding were tried in the 2004 tests. The weight of the over powder wadding ranged from 26 to 60 grains, and averaged 45 grains. The weight of the over the shot wadding ranged from 12 to 44 grains, and averaged 30 grains. It is believed that the shot was held together, protected from contacting the side of the bore when too large a quantity of tow wadding was used.

After conducting tests it was found that 14 grains of tow was adequate for both over powder wadding and over shot wadding. For the balance of the testing this amount of tow wadding was used.

Too many different sizes and types of buckshot were used in the 2004 tests, therefore only one size and quantity of soft lead buckshot would be used for tests in all of the 4-gauge barrels. The size selected should lie closely in even layers, at least 4 buckshot per layer (preferably more).

We aquired a large quantity of .38 caliber buckshot on EBay. We purchased and tested ten pounds to be sure that it was made from soft lead. After it was tested (6 BHN - soft lead using a LBT Hardness tester) and found satisfactory, one hundred more pounds were purchased. The shot was made by National Lead Co., New York, NY. It was packaged in one pound boxes, date packed 4.53, and marked Buckshot Lead Coarse. The quality of the shot was more than adequate for the testing. This size of buckshot lay in five pellet layers in the 4-gauge barrels.

A cartridge former was made to use for making paper cartridges for buckshot. A few buckshot cartridges were tried in the oval muzzle barrel. There was no noticeable difference in the patterns. Loading the charge of buckshot in a cartridge was faster and a more reliable method of loading buckshot.

The tests resumed on April 27, 2005 with adjustments to quantities of gunpowder, tow wadding and buckshot.

These quantities would be used for the blunderbuss evaluation tests. The 4-gauge barrels were loaded with 330 grains (12 drams) of gunpowder and 32 .38 caliber (5.8 ounces) buckshot. The proportion of gunpowder to buckshot by weight is 13%. The 10-gauge barrel was loaded with 150 grains (5.5 drams) of gunpowder and 24 .30 caliber (2.3 ounces) soft lead cast buckshot. The proportion of gunpowder to buckshot by weight is 15%.

Both over powder and over shot tow wadding of 14 grains was used for the series of tests for evaluating blunderbusses performance. At least 12 patterning tests were completed with these loads with each of the six barrels. For reliable test results an average of at least ten patterning tests conducted under the same conditions for each barrel must be used. Dependable results may not be obtained with a smaller number of tests.[19]

A total of 108 patterning tests were conducted for the blunderbuss barrels evaluation series of tests. The oval muzzle barrel was tested more times than the other barrels because of testing of paper buckshot cartridges. The width of the shot patterns made by the oval muzzle barrel was consistently wider than the height of the pattern. Only one of the twenty four test patterns of the oval muzzle barrel did not have the typical wider pattern. The results of these tests prove that the blunderbuss barrel did scatter shot over a larger area than a gun barrel without any flare.

There are significant variations in the size of shot patterns made by blunderbusses using identical charges of powder, shot, and wadding. One of the reasons for the variations of test patterns that were completed in this study is attributed to tow wadding. It is not a good material for wadding and is not very uniform. Examining recovered tow wads confirms this fact. The wadding is dangerous in dry weather due to its liability to set fire to the dry grasses. Some of the variations in size of patterns are attributed to where the flared section of the blunderbuss bore starts.

Other types of wadding were also used. Some was made by the author, from leather, felt, and paste board using an arch punch. Other wadding was purchased from various muzzle loading supply sources. The shot patterns made by the cylinder bore barrel using both the authors and the available commercial wadding (a fiber over powder wad and a fiberboard over shot wad) very similar to those made using tow. The shot patterns made by the blunderbuss barrels averaged slightly larger than those made with tow wadding with less variation in size.

THE RESULTS OF THE TESTING

4- Gauge Barrels	PATTERN MEASUREMENTS AT 10 YARDS					Number Of tests
	Average			Diameter Range		
	Width	Height	Diameter	Smallest	Largest	
1. Long Flare	36.1	35.3	38.9	34	56	12
2. Short Flare	34.2	30.6	38.6	31	53	12
3. Cylinder	19.2	19.4	21.3	19	23	18
4. Oval Muzzle	37.0	30.6	40.4	30	54	24
5. Long Flare	30.1	28.9	35.5	29	52	12
5. Modified	31.1	32.1	38.5	30	57	12
10-Gauge						
6. Short Flare	29.5	30.1	34.7	31	52	18

Figure 13. Test results.

The statement made in *Did It Work?* ". . . that the bell of a blunderbuss had very little effect on the dispersion of the shot" is obviously wrong, and it is a myth.

ENDNOTES

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